Canada's
Forest
Industry

the next twenty years: prospects & priorities

SIMONS
Woodbridge, Reed
& Associates

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World
Demand/Supply

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VOLUME II

WORLD DEMAND - SUPPLY

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PREFACE
TO VOLUME II

This study of the Canadian Forest Products Sector was commissioned by the Canadian Forestry Service. The purpose of the study is to assess the development potential for the sector. The study assesses the demand outlook for existing and potential forest products, the current and potential competitive position of the various sub-sectors of the industry in Canada and the available resources.

The full report on this study comprises six volumes. The contents of the full report are outlined as follows:

Volume I	Strategic Analysis
Volume II	World Demand - Supply
Volume III	Pulp and Paper
Volume IV	Wood Products
Volume V	Fibre Assumptions
Volume VI	Cost Projections

Volume II provides one of the 'building blocks' of the analyses presented in Volumes III to V. Its purpose is to develop a scenario of world and regional demand for forest products as well as an assessment of global and regional industrial roundwood supply. In addition, we examine some other important factors which are likely to have an impact on future demand and supply levels. These include impediments and stimulants to trade (e.g. tariffs, non-tariff barriers and export incentives), transportation modes and costs, currency values and exchange rate projections. We also provide a preview of self-sufficiency levels globally. We examine trade patterns in some basic raw materials in world trade. This serves as an introduction to the product sector analyses presented in Volume III (pulp and paper sector) and Volume IV (wood products sector).

I

INTERNATIONAL DEMAND OUTLOOK

Situation Assessment

Outlook projections for world consumption and production of industrial forest products to the year 2000 have been prepared by Chase Econometrics and the statistics and economic analysis staff of the FAO Forestry Department. The projections are based upon 1980 to 1984 average data and are driven by forecasts of economic growth and gross fixed capital formation. The differences in the two projections are largely the result of different assumptions being made on these two critical variables. Both projections were confined to so-called modern sector products; sawnwood, wood-based panels, pulp, paper and paperboard. Industrial roundwood end products, fuelwood and domestic firewood were not included in the projections.

It is the opinion of Woodbridge, Reed and Associates that neither the FAO nor the Chase projections are sufficiently accurate in their entirety to be used as the basis for developing the "credible scenario" of world supply and demand for forest products to the year 2000 and beyond. The remaining comprehensive international studies currently available publicly were prepared some years ago and consider only the period 1990 and 2000. The projections made in many of these latter reports are based predominantly upon the experiences of the 1970s and, as a result, are not influenced by the worldwide recession of the early 1980s, and subsequent recovery. In view of many industry analysts, the economic factors which caused the steady decline in production/consumption between 1980 and 1982 have tended to negate much of the optimism which pervaded studies such as the FAO/Industry Working Party projections. They are now considered by many analysts to be unrealistically high. Although WRA concurs with this opinion, much of the country/regional detail contained in the report is still useful background information. Also, the pulp and paper portions of the Chase/FAO projections were subjected to more rigorous analysis than were the wood products projections. Consequently, they are useful input to the analysis underlying the determination of the "credible scenario" presented in this report.

Two other recent studies were evaluated, but neither was sufficiently comprehensive to form the basis for the required international outlook for the purposes of this study. Resource Information Systems Inc. (RISI) has prepared a worldwide projection of paper and paperboard consumption to the year 2000, but their recent forecasts of wood products demand are confined to North America. The UN Economic Commission for Europe (ECE) completed its fourth report on European Timber Trends and Prospects (ETTS IV-2000) in 1986. This document deals in considerable depth with the Western and Eastern European situation for all forest products but, because of its European mandate, the ECE does not provide quantitative assessments for other regions.

Information and projections contained in the above-mentioned documents have been supplemented by other regional and international information sources and the Woodbridge, Reed data base to formulate the industrial forest products consumption, fibre demand and industrial roundwood supply projections contained in this report. The worldwide totals have been built up from regional and sub-regional analyses and, in our opinion, are based upon the best available information. In total, our projections indicate a somewhat lower level of incremental consumption than has been postulated by either the 1986 Chase and FAO scenarios or by the 1980/82 FAO industry Working Party projections. The rationale behind the Woodbridge, Reed projections is contained in the following sections.

PAST TRENDS IN FOREST PRODUCTS CONSUMPTION

Paper and Paperboard

Overview

The period from 1970 to 1985 saw many changes in paper and paperboard production and consumption. It was characterized by shifts in significant factors that affect supply/demand relationships. Some of these changes are summarized below:

- The major producing/consuming countries in North America, Western Europe and Japan continued to increase their consumption of paper products, using from 136 kg to 177 kg per capita, an increase of 30 per cent.

  In addition to the increase in consumption, these regions (commonly referred to as the industrialized nations) also shifted usage patterns to a larger proportion of higher valued products such as computer paper, tissue and toweling, and boxboards, from commodity grades such as newsprint, linerboard and packaging. During the period, consumption of printing and writing grades grew worldwide by 4.2 per cent per year, surpassing the average growth of world Gross Domestic Product which was 3.2 per cent.

  In comparison, newsprint grades grew at an average annual rate of 2.0 per cent and other paper and paperboard grades grew at 2.4 per cent.

- Developing countries and the centrally planned economies also exhibited growth in consumption per capita during the period. While volume increases were much smaller than those in the industrialized nations, growth rates from the 1970 base were as high or higher.

- World inflation during the last half of the 1970s increased dramatically, in large part due to skyrocketing crude oil prices. It has been estimated that each increase of US$5 per barrel in crude oil prices equates to a one per cent increase in world inflation. The fourfold increase in crude oil prices in 1974, therefore, had a dramatic effect on costs. In turn, the severe economic shock waves which followed resulted in significant increases in interest rates and the cost of capital which peaked in the early 1980s.

  The effect was a dramatic reduction in paper and paperboard consumption during the last half of 1974 and in 1975. However, consumption returned to more normal levels in the last half of the 1970s as world economic recovery occurred. The industrialized nations were the fastest to recover paper consumption with developing countries lagging.

The 1981 to 1982 world downturn was even more severe than that of 1974/75 and consumption did not recover to the previously established trend line following this downturn as it did after the 1974/75 recession.

The effects of higher capital and energy costs have resulted in some major factors which have influenced the pulp and paper industry as follows:

- The size of economically justifiable mills (i.e. minimum efficient scale) has steadily increased. Higher production capacities at mills have been accompanied by a wide variety of technological improvements designed to create new products which are cost effective and provide acceptable financial returns to investors.

- The use of new fibre sources such as plantation timber, an increased usage of short-fibred (hardwood) pulps such as eucalyptus, improved and increased usage of secondary fibre (recycled waste) and the development of higher yield mechanical pulps have been some of the major changes in the industry since 1970.

- In addition to the above changes in plant and fibre aspects, paper makers have achieved significant improvements in their production. Average sheet weights have been reduced by the usage of improved papermaking equipment, and new technology has resulted in higher quality, lower cost production.

  There have been increases in the usage of fillers, pigments and clays to increase finished paper volumes and improve printing surfaces while decreasing the fibre content and the overall cost of raw materials on a per tonne basis.

- The industry has become much more integrated during the period; partly as a result of the high capital costs required to build new mills or replace obsolete or inefficient equipment.

- New suppliers have emerged in the lower fibre cost regions and new products have been developed to meet the changing demands of consumers.

- The industry is no longer dominated by the traditional suppliers.

The result has been that producers in the industrialized nations are concentrating more on the production of higher value-added products. In addition, most of the developing countries are increasing their papermaking facilities to meet, as closely as possible, their increasing domestic requirements in order to minimize the use of higher cost imports. Regional specialization has become more apparent as countries strive to optimize the use of their fibre resources.

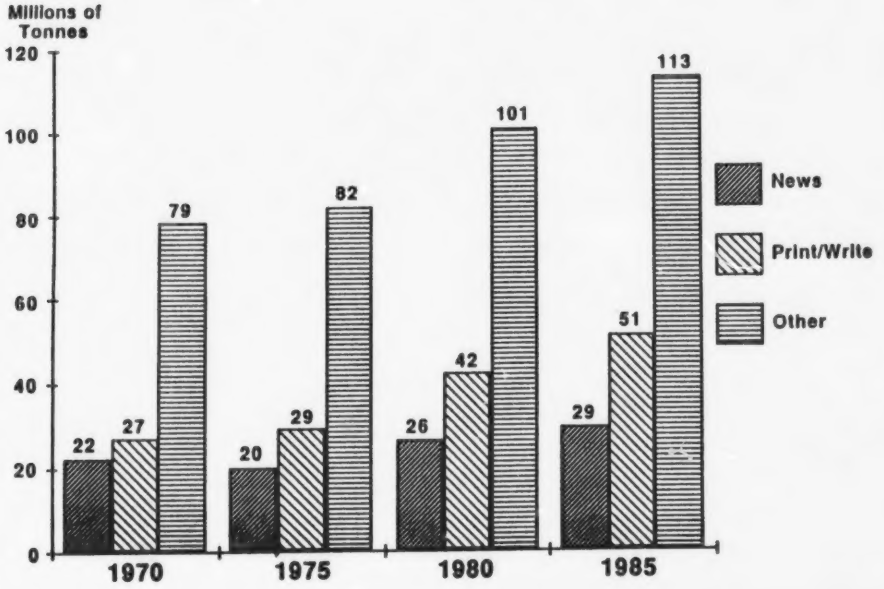
Discussion

During the period from 1970 to 1985, world apparent consumption of paper and paperboard products increased from 128 million tonnes to 193 million tonnes. This increase of 65 million tonnes represents a compound growth rate of 2.8 per cent per year.

The world level of consumption of paper and paperboard has exhibited a close relationship with the growth in economic levels as measured by Gross Domestic Product indicators (GDP). The world's average consumption of paper and paperboard products has remained fairly constant at 15.5 tonnes per million dollars of GDP since 1960. This average has been higher in industrialized nations than in the developing world. However, since 1960 the developing countries have shown an accelerated growth rate which is expected to continue. For example, the growth of newsprint consumption in Asia during the 1970s has been a major factor in the total world newsprint volume increase of 7.4 million tonnes.

Figure 1-1 shows the breakdown of paper and paperboard consumption volumes by major product categories from 1970 to 1985.

Figure 1-1
World Paper and Paperboard Consumption
By Product 1970 - 1985



A breakdown of annual growth rates by major product category is as follows:

Paper Grade	**Annual Growth 1970-1985 (per cent)**
Newsprint	2.0
Printing & writing	4.2
Other Paper and paperboard	2.4
Total paper and paperboard	**2.8**

Table 1-1 shows the historical growth in consumption on a regional basis for total paper and paperboard.

Table 1-1
Paper and Paperboard Apparent Consumption by Region 1970-1985
(millions of tonnes)

	1970	**1985**	**Volume Change**	**Annual Growth (%/yr.)**
North America	**53.4**	**73.1**	**19.7**	**2.1**
Canada	3.3	5.2	1.9	3.1
US	50.1	67.9	17.8	2.1
Western Europe	**33.9**	**46.4**	**12.5**	**2.1**
Scandinavia	2.7	3.7	1.0	2.1
Others	31.2	42.7	11.5	2.1
Latin America	**5.6**	**10.4**	**4.8**	**4.2**
Brazil	1.4	3.7	2.3	6.7
Chile	0.2	0.3	0.1	2.7
Others	4.0	6.4	2.4	3.2
Asia-Pacific	**17.1**	**30.8**	**13.7**	**4.0**
Japan	12.6	20.3	7.7	3.2
Dev. Oceania	1.8	2.9	1.1	3.2
Others	2.7	7.6	4.9	7.1
Africa and Middle East	**2.4**	**4.7**	**2.3**	**4.6**
Centrally Planned	**15.2**	**27.2**	**12.0**	**4.0**
USSR	6.5	9.7	3.2	2.7
Eastern Europe	4.4	5.9	1.5	2.0
China	4.2	11.4	7.2	6.9
Other C.P. Asia	0.1	0.2	0.1	4.7
World Total	**127.6**	**192.6**	**65.0**	**2.8**

Source: FAO

In terms of volume the major growth areas have been in the industrialized nations, in particular the USA, Western Europe and Japan. However, in terms of percentage growth per year, the fastest growth areas have been Other Asia (including Taiwan and Korea, the People's Republic of China and Latin America).

A further breakdown into the three major product categories is shown in Tables 2 to 4.

Table 1-2
Newsprint Apparent Consumption
(millions of tonnes)

	1970	1985	Volume Change	Annual Growth (%/yr.)
North America	**9.6**	**13.4**	**3.8**	**2.3**
Canada	0.7	1.0	0.3	2.4
US	8.9	12.4	3.5	2.2
Western Europe	**5.4**	**6.2**	**0.8**	**1.0**
Scandinavia	0.5	0.5	-	-
Other	4.9	5.7	0.8	1.0
Latin America	**1.1**	**1.3**	**0.2**	**1.1**
Brazil	0.3	0.3	-	-
Chile	0.1	0.1	-	-
Others	0.7	0.9	0.2	1.7
Asia-Pacific	**3.2**	**5.0**	**1.8**	**3.0**
Japan	2.0	2.8	0.8	2.3
Dev. Oceania	0.5	0.8	0.3	3.2
Others	0.7	1.4	0.7	4.7
Africa and Middle East	**0.4**	**0.7**	**0.3**	**3.8**
Centrally Planned	**2.0**	**2.5**	**0.5**	**1.5**
USSR	1.0	1.2	0.2	1.2
Eastern Europe	0.4	0.5	0.1	1.5
China	0.6	0.7	0.1	1.0
Others	-	0.1	0.1	-
World Total	**21.7**	**29.1**	**7.4**	**2.0**

Source: FAO

Newsprint

Newsprint is mainly used for newspapers in the industrialized world, but in developing countries it can be used in other forms including school exercise books, workbooks, some business forms and even computer forms. It is the basic media for written communication of both news and advertising information. The increased consumption of newsprint from 1970 to 1985 was the lowest of the three major product categories. Of the 7.4 million tonne increase, the US accounted for 3.5 million tonnes or 47 per cent, while the Asia-Pacific accounted for 1.8 million tonnes (24%). In the US, newsprint circulation per household peaked in the late 1970s. The major growth area for newsprint has been in other Asian countries such as Korea and Taiwan and Indonesia.

Printing and Writing Papers

This category covers a wide range of products including top quality letter sheets, magazine, book, telephone directory and computer papers. In general, the highest value added products are in this category.

In terms of volume, the 23.6 million tonne increase represented an average annual growth rate of 4.2 per cent per year. The high growth rate illustrates the strengthening performance of higher value added products compared with the commodity grades.

Table 1-3 outlines the major growth regions. It is of interest to note that growth in terms of percentage per year has been in the 3.5 to 6.6 per cent area for North America, Western Europe (including Scandinavia) and Latin America.

Table 1-3

Printing/Writing Apparent Paper Consumption

(millions of tonnes)

	1970	1985	Volume Change	Annual Growth (%/yr.)
North America	**10.8**	**19.7**	**8.9**	**4.1**
Canada	0.6	1.7	1.1	7.2
US	10.2	18.0	7.8	3.9
Western Europe	**8.7**	**14.8**	**6.1**	**3.6**
Scandinavia	0.6	1.3	0.7	5.3
Others	8.1	13.5	5.4	3.5
Latin America	**1.0**	**2.6**	**1.6**	**6.6**
Brazil	0.3	1.0	0.7	8.4
Chile	0.1	0.1	-	-
Others	0.6	1.5	0.9	6.3
Asia-Pacific	**3.3**	**7.3**	**4.0**	**5.4**
Japan	2.2	4.5	2.3	4.9
Dev. Oceania	0.3	0.6	0.3	4.7
Others	0.8	2.2	1.4	7.0
Africa and Middle East	**0.6**	**1.2**	**0.6**	**4.7**
Centrally Planned	**2.9**	**5.2**	**2.4**	**4.1**
USSR	1.0	1.5	0.5	2.7
Eastern Europe	0.8	0.9	0.1	7.9
China	1.1	2.8	1.7	6.4
Others	-	-	-	-
World Total	**27.3**	**50.9**	**23.6**	**4.2**

Source: FAO

Other Paper and Paperboard

This category includes a variety of grades such as: linerboard and corrugating medium used in the manufacture of cartons; wrapping papers including multi-wall and grocery sacks; tissue products such as sanitary household products; paperboard used in manufacturing food boxes and milk cartons.

In terms of volume, it has been the largest growth segment, accounting for 51.8 per cent or 34 of the 65 million tonne total paper and paperboard increase.

Major growth regions have been the US, Europe and Asia. Table 1-4 outlines growth by regions.

Table 1-4
Other Paper and Board Apparent Consumption
(millions of tonnes)

	1970	1985	Volume Change	Annual Growth (%/yr.)
North America	**33.1**	**40.0**	**6.9**	**1.3**
Canada	2.1	2.5	0.4	1.2
US	31.0	37.5	6.5	1.3
Western Europe	**19.8**	**25.4**	**5.6**	**1.7**
Scandinavia	1.6	1.9	0.3	1.2
Others	18.2	23.5	5.3	1.7
Latin America	**3.5**	**6.5**	**3.0**	**4.2**
Brazil	0.9	2.4	1.5	6.8
Chile	0.1	0.2	0.1	4.7
Others	2.5	3.9	1.4	3.0
Asia-Pacific	**10.7**	**18.5**	**7.8**	**3.7**
Japan	8.4	13.0	4.6	3.0
Dev. Oceania	1.0	1.5	0.5	2.7
Others	1.3	4.0	2.7	7.8
Africa and Middle East	**1.4**	**2.8**	**1.4**	**4.7**
Centrally Planned	**10.4**	**19.4**	**9.0**	**4.2**
USSR	4.5	7.0	2.5	3.0
Eastern Europe	3.3	4.5	1.2	2.1
China	2.5	7.8	5.3	7.9
Others	0.1	0.1	-	-
World Total	**78.9**	**112.6**	**33.7**	**2.4**

Source: FAO

Consumption per Capita

During the 1970 to 1985 period world consumption per capita increased from 35 kg to 40 kg per year, an increase of 14 per cent.

A breakdown of this increase is as follows:

World Consumption of Paper and Paperboard

	Industrialized Nations	Developing World	Centrally Planned	Total World
Total Consumption - million tonnes				
1970	104	10	14	128
1985	145	21	27	193
Increase	**41**	**11**	**13**	**65**
Consumption per capita - kg per person				
1970	136	7	13	35
1985	177	9	18	40
Increase	**41**	**2**	**5**	**5**
Per Cent	**30**	**29**	**38**	**14**

Source: PPI, FAO

During the 15 year period, per capita consumption in the industrialized nations taken as a whole increased by 41 kg or 30 per cent. Although the growth rates for per capita consumption in the developing and centrally planned countries are similar to those for the developed world, they are based on much lower volumes.

Wood Pulp and Other Fibres

The 65 million tonne increase in paper and paperboard production from 1970 to 1985 has resulted in an increase in the usage of wood pulps, including chemical, mechanical and other pulps used in the paper finish.

In addition to wood pulp, there were also significant increases in the usage of waste paper, coatings and fillers.

Figure 1-2 illustrates the growth of total paper grade wood pulp from 1970 to 1985.

The largest component of the 33.8 million tonne increase was bleached kraft pulp which accounted for 20.4 million tonnes or 60 per cent of the total increase in consumption.

Figure 1-2
Papergrade Woodpulp
Apparent Consumption By Grade
(Percent of Total Use)

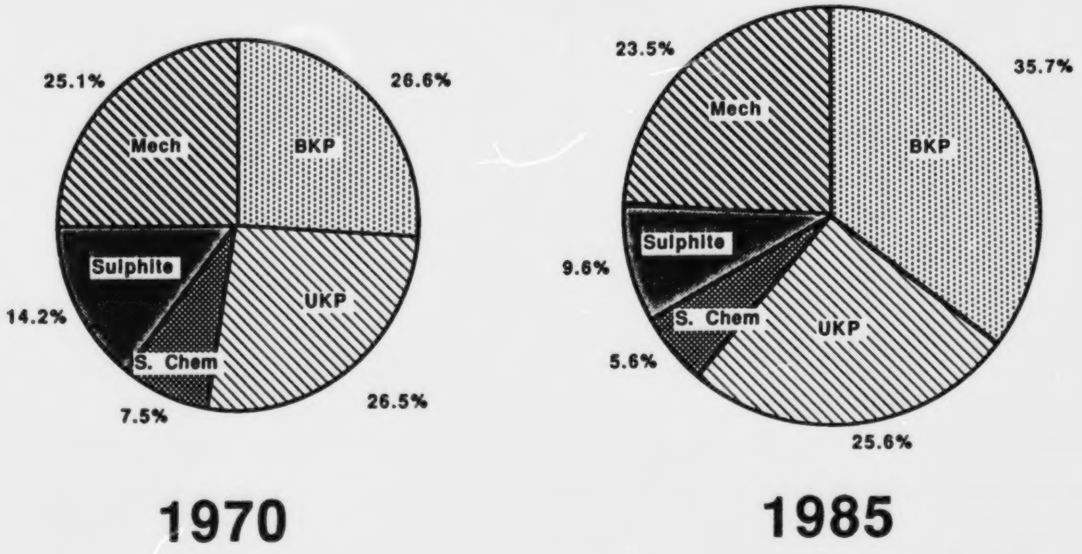


Table 1-5 illustrates the increase in paper grade wood pulp by individual grade between 1970 to 1985 and shows the proportion of wood pulp used in paper and board production.

Table 1-5

Apparent Consumption of Paper Grade Wood Pulp

(millions of tonnes)

	1970		1985		Volume Increase (Decrease)	Growth Rate (%/yr.)
	Vol.	%	Vol.	%		
Bleached kraft[1]	25.8	27.0	46.2	35.7	20.4	4.0
Unbleached kraft	26.0	27.2	33.1	25.6	7.1	1.6
Semi-chemical	7.7	8.1	7.2	5.6	(0.5)	(0.4)
Sulphite	13.4	14.0	12.4	9.6	(1.0)	(0.5)
Mechanical	22.7	23.7	30.5	23.5	6.3	2.0
Total Wood Pulp	**95.6**	**100.0**	**129.4**	**100.0**	**33.8**	**2.0**
Paper and Paperboard Production	**128.1**		**192.8**		**64.7**	**2.8**
Wood pulp stated as a percentage of finished paper and paperboard production	74.6		67.1		(7.5)	

Source: FAO, PPI

[1] BKP includes both softwood and hardwood BKP

Wood pulp continues to be the largest component of paper furnish. In 1970, a total of 95.6 million tonnes of wood pulp were used to produce 128.1 million tonnes of paper and paperboard, representing 74.6 per cent of the finished volume. In 1985, 129.4 million tonnes of wood pulp were used to produce 192.8 million tonnes of paper and paperboard, amounting to 67.1 per cent of the finished volume. The increase in bleached kraft pulp usage (20.4 million tonnes) is representative of the move to higher quality pulps which are required to produce the higher valued paper products being demanded by consumers in the industrialized nations. Unbleached kraft pulp (UKP), which increased by 7.1 million tonnes, is mainly used on-site in integrated pulp and paper operations. More mechanical pulps including thermomechanical (TMP) and chemi-thermomechanical (CTMP) which are higher yield pulps are being used in grades such as newsprint and tissue. They are generally replacing the use of sulphite pulp which has become environmentally and economically less acceptable.

The reduction of 7.5 per cent in the proportion of wood pulp used in the total paper furnish has been made possible partly by the increased usage of recycled waste paper. In addition, more pigments and fillers are being added to some grades, notably printing and writing papers.

The increased usage of these lower cost paper furnish components, along with improvements in equipment, faster machine speeds and lower basis weights has enabled the paper industry to keep real paper price increases to a minimum over the 1970 to 1985 period.

An examination of wood pulp consumption by region (Table 1-6), indicates the US, Western Europe and Japan will continue to be the largest consumers relative to higher paper production volumes. However, the major growth areas since 1970 have been Latin America (6.5 per cent per year) and the Asian countries excluding Japan and China (9.1 per cent per year). It must be noted, however, that while percentage increases were much larger, wood pulp volumes consumed are still small relative to the industrialized nations.

Table 1-6
Paper Grade Wood Pulp Apparent Consumption
(millions of tonnes)

	1970	1985	Volume Change	Annual Growth (%/yr.)
North America	**48.2**	**62.6**	**14.4**	**1.8**
Canada	11.5	13.6	2.1	1.1
US	36.7	49.0	12.3	1.9
Western Europe	**25.3**	**31.9**	**6.6**	**1.6**
Scandinavia	10.2	14.1	3.9	2.2
Others	15.1	17.8	2.7	1.1
Latin America	**1.8**	**4.6**	**2.8**	**6.5**
Brazil	0.8	2.7	1.9	8.5
Chile	0.2	0.3	0.1	2.7
Others	0.8	1.6	0.8	4.7
Asia-Pacific	**10.8**	**15.2**	**4.4**	**2.3**
Japan	8.9	11.3	2.4	1.6
Dev. Oceania	1.3	1.7	0.4	1.8
Others*	0.6	2.2	1.6	9.1
Africa and Middle East	**0.5**	**1.5**	**1.0**	**7.6**
Centrally Planned	**9.0**	**13.6**	**4.6**	**2.8**
USSR	6.1	7.8	1.7	1.7
Eastern Europe	2.3	3.6	1.3	3.0
China*	0.6	2.2	1.6	9.0
Others	-	-	-	-
World Total	**95.6**	**129.4**	**33.8**	**2.0**

Source: FAO

* Excluding non-wood fibre pulps; see Table 1-7

Wood Pulp Production

During the period from 1970 to 1985 the largest regional increase in paper grade wood pulp production occurred in North America - an increase of 16.3 million tonnes. The next largest increases were in Western Europe (5.4 million) and Latin America (4.2 million). In total, the developing countries supplied 5.9 million tonnes or 18 per cent of the total increase of 34.8 million tonnes while the centrally planned economies supplied 4.6 million tonnes or 13 per cent. On an annual percentage growth basis, the developing countries outstripped the industrialized nations, averaging increases of 9.4 per cent versus 1.7 per cent. The centrally planned countries averaged 2.8 per cent growth per year.

Table 1-7
Paper Grade Wood Pulp Production by Region
(millions of tonnes)

	1970	1985	Volume Change	Annual Growth (%/yr.)
North America	**52.0**	**68.3**	**16.3**	**1.8**
Canada	16.2	20.3	4.1	1.5
US	35.8	48.0	12.2	2.0
Western Europe	**23.5**	**28.9**	**5.4**	**1.4**
Scandinavia	15.8	18.7	2.9	1.1
Others	7.7	10.2	2.5	1.9
Latin America	**1.6**	**5.8**	**4.2**	**9.0**
Brazil	0.8	3.6	2.8	10.6
Chile	0.4	0.8	0.4	4.7
Others	0.4	1.4	1.0	8.7
Asia-Pacific	**9.5**	**12.3**	**2.8**	**1.7**
Japan	8.2	9.3	1.1	0.8
Dev. Oceania	1.1	1.9	0.8	3.7
Others*	0.2	1.1	0.9	12.0
Africa and Middle East	**0.5**	**2.0**	**1.5**	**9.7**
Centrally Planned	**9.1**	**13.7**	**4.6**	**2.8**
USSR	6.1	9.0	2.9	2.6
Eastern Europe	2.4	3.1	0.7	1.7
China*	0.6	1.6	1.0	6.8
Others	-	-	-	-
World Total	**96.2**	**131.0**	**34.8**	**2.1**

Source: FAO

* Woodfibre pulp only, production of non-wood fibre pulps for India and China are as follows (million tonnes):

	1970	1985
India	0.6	1.8
China	2.2	5.5

Since 1970, there have been some important changes in regional self-sufficiencies for paper grade wood pulp. In the industrialized nations, Canada and the Nordic countries remain the principal sources of surplus (export) pulp but the positions have changed - the Canadian surplus has grown while that of Scandinavia has contracted due to much greater forward integration into papermaking. The deficit in Japan has increased three fold while developed Oceania (New Zealand and Australia) has become a net exporter rather than a net importer on the strength of New Zealand's market pulp capacity. New pulp production for South Africa has had a similar impact upon Africa and the Middle East.

In the developing world, Latin America has become a net export region due to expanded pulp capacity in Brazil and Chile. Despite rapid growth in wood pulps from Asia (excluding Japan) consumption has increased even faster so that the net deficit has risen by a factor of four.

In the centrally planned economies, the increased surplus for the USSR has been more than offset by the incremental needs of Eastern Europe which, for its part, has gone from a net surplus to a net deficit area. In China, the wood pulp deficit has increased six-fold. Details are shown in Table 1-8.

Table 1-8
Trends in Apparent Self-Sufficiency for Paper Grade Wood Pulp
(million metric tonnes)

	Apparent Self-Sufficiency		
	1970 Surplus or (Deficit)	1985 Surplus or (Deficit)	1970-85 Change
North America	**3.8**	**5.7**	**+1.9**
Canada	4.7	6.7	+2.0
US	(0.9)	(1.0)	-0.1
Western Europe	**(1.8)**	**(3.0)**	**-1.2**
Scandinavia	5.6	4.6	-1.0
Others	(7.4)	(7.6)	-0.2
Latin America	**(0.2)**	**1.2**	**+1.4**
Brazil	-	0.9	+0.9
Chile	0.2	0.5	+0.3
Others	(0.4)	(0.2)	+0.4
Asia-Pacific	**(1.3)**	**(2.9)**	**-1.6**
Japan	(0.7)	(2.0)	-1.3
Dev. Oceania	(0.2)	0.2	+0.4
Others	(0.4)	(1.1)	-0.7
Africa and Middle East	**-**	**0.5**	**+0.5**
Centrally Planned	**0.1**	**0.1**	**-**
USSR	-	1.2	+1.2
Eastern Europe	0.1	(0.5)	-0.6
China	-	(0.6)	-0.6
Others	-	-	-
World Total	**0.6***	**1.6***	**na**

Source: FAO

na not appropriate
* net addition to inventory

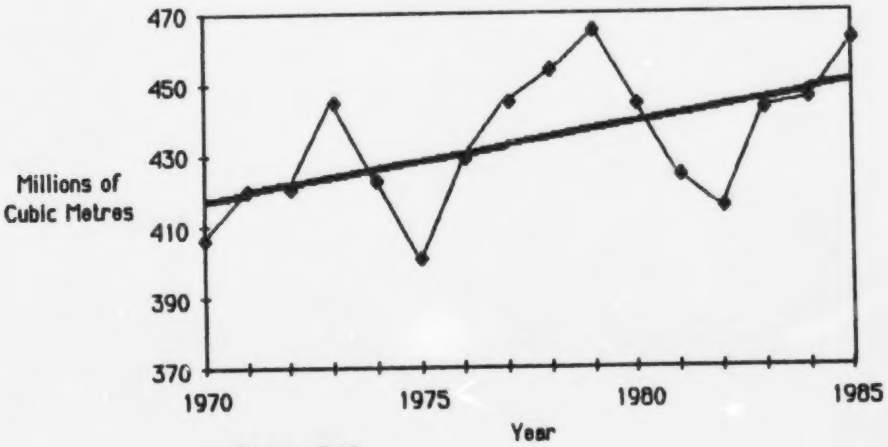
Sawnwood Products

The markets for lumber can be defined as mature and changes in consumption levels are closely linked to changes in construction activity. There has, however, also been evidence of changes in both product and utilization technology over the period. Substitute products, such as steel and plastics, have had an impact but this impact has been offset by a greater demand for lumber in developing countries and a more sophisticated use of lumber in the industrialized nations (e.g. engineering wood structures and treated wood).

The consumption of lumber, both hardwood and softwood, has increased fairly slowly over the past 15 years (Figure 1-3). The overall trend for the period has been for an increase at less than 1.0 per cent per annum but there have been significant annual fluctuations. These fluctuations are closely linked to worldwide economic conditions. Thus the oil crisis in the mid 1970s and the recession in the early 1980s can both be seen to have had a significant effect on lumber consumption.

By 1985 the total demand amounted to approximately 462 million m^3 (equivalent to almost 200 billion board feet). Of this total, softwood lumber represents about 75 per cent.

Figure 1-3
World Sawnwood Consumption



Source: FAO

The results of the analysis of consumption trends by region are shown in Table 1-9. North America, the USSR and Western Europe are the major users of sawnwood lumber. Although there was significant growth in consumption over the time period by other regions, they only accounted for 31 per cent of consumption in 1970 and 37 per cent of the total in 1985.

Table 1-9
World Consumption of Lumber Products 1970-1985
(million cubic metres)

	1970	Volume 1985	Annual Change	Growth (%/yr.)
North America	**102.7**	**132.9**	**30.2**	**0.8**
Canada	9.6	16.2	6.6	1.9
US	93.1	116.7	23.6	0.7
Western Europe	**69.7**	**69.2**	**-0.6**	**0.0**
Scandinavia	10.2	8.9	-1.3	-0.4
Others	59.5	60.3	0.8	0.0
Latin America	**15.2**	**26.9**	**11.8**	**4.5**
Brazil	7.1	15.7	8.6	7.5
Chile	0.8	1.5	0.7	0.8
Others	7.3	9.7	2.4	1.5
Asia-Pacific	**65.2**	**72.8**	**7.6**	**0.4**
Japan	45.4	33.6	-11.8	-2.0
Dev. Oceania	5.7	6.0	0.3	0.4
Others	14.1	33.2	19.1	5.9
Africa and Middle East	**9.3**	**18.8**	**9.5**	**6.3**
Centrally Planned	**144.5**	**141.3**	**-3.2**	**-0.6**
USSR	108.7	89.7	-19.0	-1.3
Eastern Europe	20.1	22.3	2.2	0.7
China	14.4	28.2	13.8	4.6
Other CP Asia	1.3	1.1	-0.2	-0.9
World Total	**406.6**	**461.9**	**55.3**	**0.5**

Softwood and hardwood combined

Source: FAO

Although, as stated above, the world's total consumption of lumber (hardwood and softwood) has been growing, albeit moderately, per capita consumption has been falling. As shown in Table 1-10 the rate of decline during the years 1970 to 1985 was about one per cent per year. The global decline in per capita consumption of lumber has been brought about by the maturing of lumber markets in the industrialized regions of the world. The rate of decline in per capita lumber consumption in the North American and Western European Regions has been about 0.5 per cent per year. The situation in the Latin American and Africa/Middle East regions differs significantly. In Latin America, lumber per capita consumption has been growing at slightly more than two per cent per year. In the Africa/Middle East region, lumber per capita consumption has been growing at a rate of nearly four per cent per year. It would seem that even though Latin America and the Africa/Middle East regions comprise less than ten per cent of total consumption, the lumber markets in these regions experienced considerable growth; however, the distribution of this growth among the countries comprising these regions was far from uniform.

The rise in per capita consumption that occurred after the oil crisis in the mid-seventies corresponds to generally buoyant market conditions experienced up to 1980. The driving force for this period of rising per capita consumption was the comparatively high per capita GNP growth rates experienced in the developed economies (e.g. in the U.S., real per capita GDP grew at an annual rate in excess of three per cent during the year 1977 to 1978).

Table 1-10
Total Lumber Per Capita Consumption
(Period 1970-1985)

Region	**Annual Growth (%/yr.)**
North America	-0.2
Western Europe	-0.4
Latin America	2.0
Asia Pacific	-1.5
Africa/Mid-East	3.1
Centrally Planned	-2.0
World	**-1.2**

Softwood Sawnwood

Consumption trends by region for softwood lumber are shown in Tables 11 and 12. World historic softwood lumber consumption is illustrated in Figure 1-4. These trends indicate that, whereas North America continues to show some increase in consumption, Western Europe is virtually static while consumption levels in Japan and the USSR have declined. In contrast, however, there is substantial growth in lesser developed regions, albeit from a lower base.

Table 1-11
World Consumption of Softwood Lumber 1970-1985
(million cubic metres)

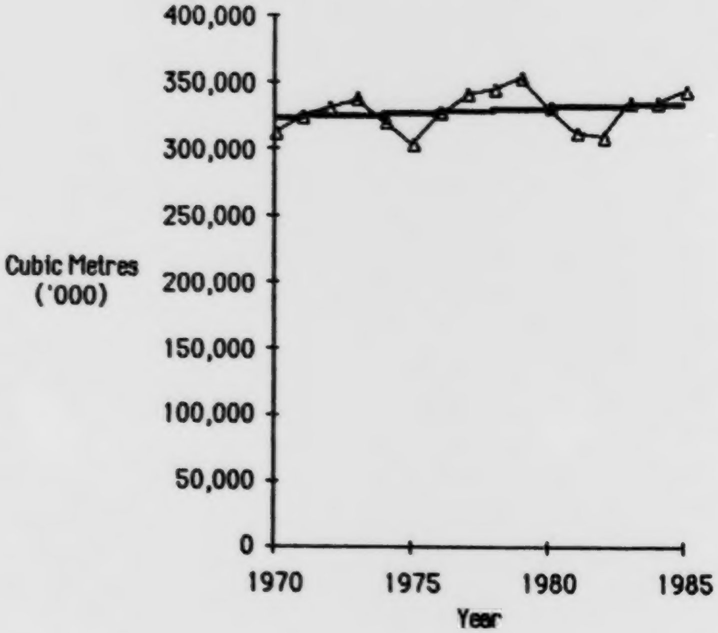
	1970	1985	Volume Change	Annual Growth (%/yr.)
North America	**84.2**	**117.1**	**32.9**	**1.2**
Canada	8.5	14.5	6.0	1.9
US	75.7	102.6	26.9	1.1
Western Europe	**55.7**	**54.3**	**-1.4**	**-0.1**
Scandinavia	9.6	8.5	-1.1	-0.3
Others	46.1	45.8	-0.3	-0.1
Latin America	**7.4**	**13.0**	**5.6**	**4.2**
Brazil	3.6	7.4	3.8	6.6
Chile	0.5	1.2	0.7	2.0
Others	3.3	4.5	1.2	1.4
Asia-Pacific	**39.9**	**36.3**	**-3.6**	**-0.5**
Japan	35.4	28.0	-7.4	-1.3
Dev. Oceania	2.9	3.9	1.0	1.5
Others	1.6	4.4	2.8	8.7
Africa and Middle East	**6.1**	**11.8**	**5.7**	**5.4**
Centrally Planned	**118.6**	**111.7**	**-6.8**	**-0.9**
USSR	93.9	77.4	-16.5	-1.8
Eastern Europe	15.1	16.3	1.2	-0.2
China	8.9	17.4	8.5	4.6
Other C.P. Asia	0.7	0.6	-0.1	-0.5
World Total	**311.9**	**344.2**	**32.3**	**0.3**

Source: FAO

Table 1-12
Softwood Lumber Consumption
(Period 1970-1985)

Region	Annual Growth (%/yr.)
North America	1.2
Western Europe	-0.1
Latin America	4.2
Asia Pacific	-0.5
Africa/Mid-East	5.4
Centrally Planned	-0.9
World	0.3

Figure 1-4
World Historic Softwood Lumber Consumption



A general downward trend in the per capita consumption of softwood lumber has also occurred during the years 1970 to 1985. As shown in Table 1-13, softwood lumber consumption per capita has been declining globally at about 1.5 per cent per year, and as softwood lumber comprised the bulk of total global lumber consumption, the downward trend for softwood is driving the decline for total per capita lumber consumption mentioned above. Latin America and Africa/Middle East were the world's high growth regions for per capita softwood lumber consumption. During the period 1970 to 1985, the per annum growth rates in these two regions were 1.7 per cent and 2.3 per respectively.

Table 1-13
Softwood Lumber per Capita Consumption
(m^3 per 1000 capita)

Region	1970	1985	Annual Growth (%/yr.)
North America	372	443	-0.1
Western Europe	158	144	-0.5
Latin America	27	32	1.7
Asia Pacific	35	24	-2.4
Africa and Middle East	13	16	2.3
Centrally Planned	95	73	-2.2
World Total	**84**	72	**-1.4**

Source: FAO, IMF

Hardwood Sawnwood

The pattern of consumption for hardwood lumber is substantially different from that of softwood lumber. Worldwide, there has been stronger growth over the period with consumption rising at about 1.3 per cent annually over the past 15 years (Figure 1-5). World consumption of hardwood lumber is shown in Table 1-14.

Figure 1-5
World Historic Hardwood Lumber Consumption

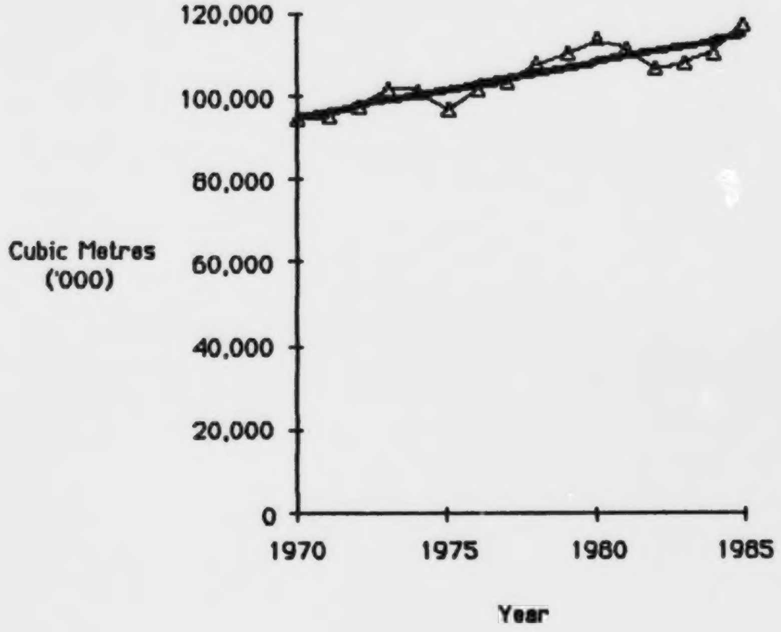


Table 1-14
World Consumption of Hardwood Lumber
1970-1985
(million cubic metres)

	1970	Volume 1985	Annual Change	Growth (%/yr.)
North America	**18.5**	**15.8**	-2.7	-1.2
Canada	1.1	1.7	0.6	1.9
US	17.4	14.1	-3.3	-1.5
Western Europe	**14.0**	**14.9**	**0.9**	**0.2**
Scandinavia	0.6	0.4	-0.2	-3.7
Others	13.4	14.5	1.1	0.3
Latin America	**7.7**	**13.9**	**6.2**	**4.8**
Brazil	3.4	8.3	4.9	8.5
Chile	0.3	0.3	0.0	-2.2
Others	4.0	5.3	1.3	1.5
Asia-Pacific	**25.3**	**36.5**	**11.2**	**1.6**
Japan	10.0	5.6	-4.4	-4.8
Dev. Oceania	2.8	2.1	-0.7	-2.3
Others	12.5	28.8	16.3	5.5
Africa and Middle East	**3.2**	**7.0**	**3.8**	**8.0**
Centrally Planned	**25.9**	**29.5**	**3.5**	**0.5**
USSR	14.8	12.3	-2.5	-1.7
Eastern Europe	5.0	6.0	1.0	0.8
China	5.5	10.8	5.3	4.7
Other C.P. Asia	0.6	0.4	-0.2	-1.8
World Total	**94.6**	**117.6**	**23.0**	**1.3**

Source: FAO

On a per capita basis there has been a slight decline in consumption, worldwide, in recent years. The levels of per capita consumption vary significantly by region (Table 1-15).

Table 1-15
Per Capita Consumption
Hardwood Lumber
(m^3 per 1000 capita)

	1970	1985	Annual Growth (%/yr.)
North America	81.8	59.9	-2.3
Western Europe	39.7	39.5	-0.2
Latin America	27.4	34.4	2.2
Asia-Pacific	22.0	24.3	-0.3
Africa and Middle East	6.7	9.6	4.6
Centrally Planned	20.9	19.3	-0.9
World Total	**25.4**	**24.5**	**-0.5**

Source: FAO, IMF

The industrialized regions consume substantially more on a per capita basis than the world average but, in North America particularly, the per capita consumption has declined whereas the developing regions show increases.

Trade between regions represented in 1985 about 11 per cent of production whereas in 1970 it was a little over 7 per cent. The great majority of this increase is accounted for by South East Asia which is responsible for over half of world hardwood lumber exports. Production in this region nearly doubled over the period to 34 million m^3 or about 30 per cent of world production. Other regions which have shown substantial increases in production are Latin America and Africa.

Wood Based Panels

The following commodities are included in the general category of "wood based panels": veneer sheets, plywood, particleboard and fibreboard. These commodities comprise the following types of panel products: hardwood and softwood plywood, blockboard, waferboard/OSB, particleboard, medium density fibreboard, hardboard and various modified forms of such panels. Veneer sheets used for plywood production in the reporting country are excluded but 4 to 4.5 per cent of production consists of veneer sheets for sale as such.

World production of wood based panels increased steadily from 1970 to 1980 at an annual rate of 3.8 per cent but with the slowing of the world economy this rate fell to 1.5 per cent in the 1980 to 1985 period. World trade for wood based panels in 1985 is representative of the patterns that have existed during the period under review. North America, Europe and Africa are net importers. Latin America, Asia Pacific and the Centrally Planned Economies have excess production available for export. Table 1-16, Table 1-17 and Figure 1-6 show the relationship between production and consumption on a regional basis.

Table 1-16
Trade in Wood Based Panels (1985)
(million cubic metres)

	Excess Demand (Importers)	Excess Production (Exporters)
North America	1.20	
Western Europe	2.78	
Latin America		0.21
Asia Pacific		4.54
Africa and Mideast	1.36	
Centrally Planned Economies	___	0.72
	5.34	5.47
Excess Production	0.13	
	5.47	

Source: FAO

Indonesia is the principal exporter (80% of Indonesian production is exported) from the Asia-Pacific region, accounting for 75 per cent of this trade. Brazil is the major Latin American exporter (68%) as is the USSR in the Centrally Planned Economies (41%).

North America as a region is a net importer but this is due entirely to consumption in the United States. Canada is a net exporter of wood based panels.

Figure 1-6
Regional Production and Consumption of All Wood Based Panels

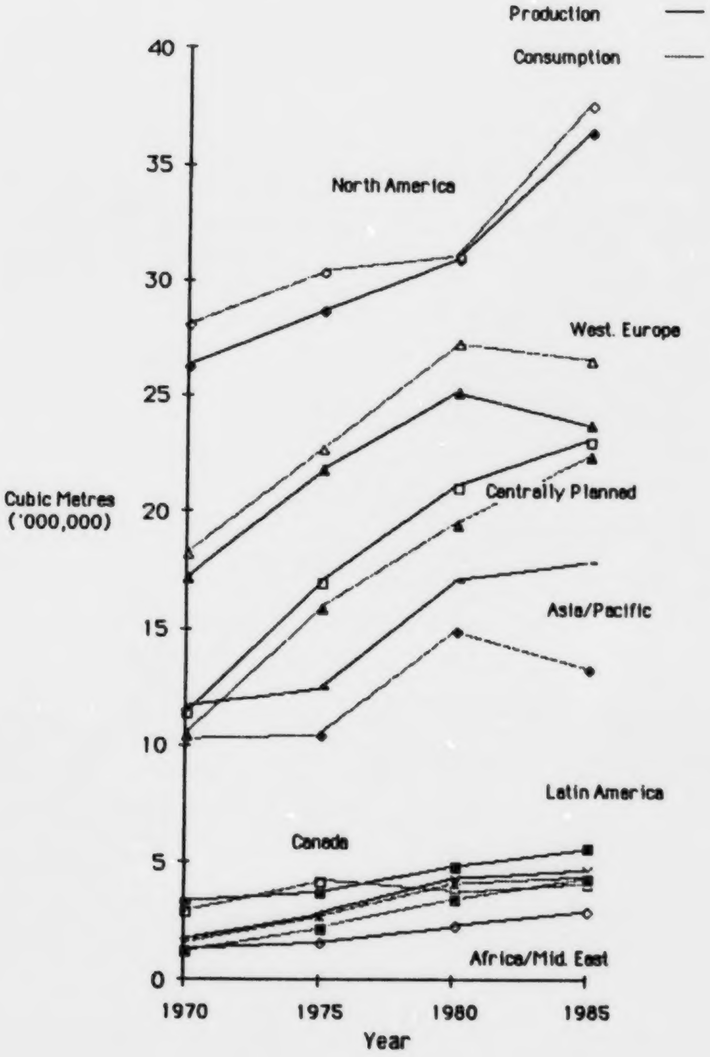


Table 1-17
World Production and Consumption of Wood Based Panels
(million cubic metres)

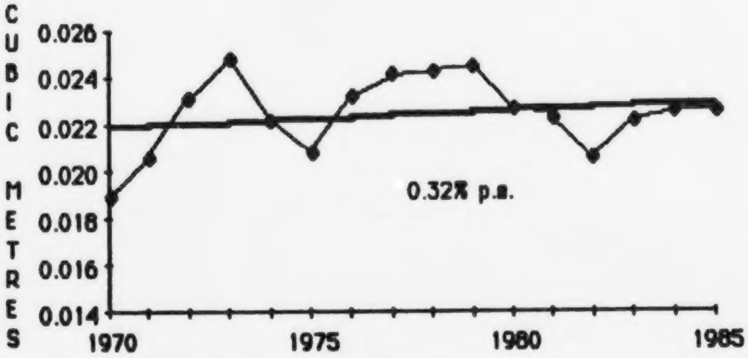
	Production 1970-85			Consumption 1970-85		
	1970	1985	Growth Rate (%/Yr.)	1970	1985	Growth Rate (%/Yr.)
North America	**26.3**	**36.4**	**0.6**	**28.1**	**37.6**	**0.1**
Canada	3.3	5.6	2.4	2.9	4.1	0.2
USA	23.0	30.8	0.3	25.2	33.5	0.1
Western Europe	**17.2**	**23.8**	**1.1**	**18.2**	**26.6**	**1.6**
Scandinavia	3.7	3.4	-0.8	2.3	2.4	1.0
Other	13.5	20.4	1.5	15.9	24.2	1.6
Latin America	**1.7**	**4.7**	**6.9**	**1.6**	**4.4**	**6.8**
Brazil	0.8	2.5	6.3	0.7	2.1	6.1
Chile	0.1	0.2	10.2	0.1	0.1	6.1
Other	0.8	2.0	7.5	0.8	2.2	7.8
Asia Pacific	**11.7**	**17.9**	**3.0**	**10.3**	**13.4**	**1.9**
Japan	8.2	7.1	-0.0	8.2	7.6	0.1
Dev. Oceania	0.8	1.3	3.1	0.8	1.3	2.8
Others	2.7	9.5	9.1	1.3	4.5	12.1
Africa and Middle East	**1.3**	**2.9**	**4.8**	**1.2**	**4.3**	**9.2**
Centrally Planned	**11.4**	**23.1**	**4.8**	**10.5**	**22.4**	**5.2**
USSR	5.9	12.9	4.9	5.4	12.1	5.0
Eastern Europe	4.5	7.4	4.2	4.7	7.5	4.0
China	1.0	2.8	6.8	0.4	2.8	29.7
Other CP Asia	ns	ns	13.5	ns	ns	13.6
World Total	**69.6**	**108.8**	**2.1**	**69.9**	**108.7**	**2.0**

Source: FAO

ns not significant (less than 0.05)

A detailed analysis of world consumption of panelboards on a per capita basis is shown in Figure 1-7. The overall trend has been for a slight increase over the period but with substantial cyclical fluctuations. The effect of the oil price shock in the mid 1970s and the 1982 recession are particularly evident. In addition, it is apparent that the strong growth in consumption, even on a per capita basis, experienced during the 1970s is now over.

Figure 1-7
World Per Capita Consumption of Wood-Based Panel



Regional per capita consumption levels are shown in Table 1-18 below.

Table 1-18
Per Capita Consumption - Panelboards
(m^3 per 1000 capita)

	1970	1985
North America	124	142
Western Europe	54	71
Latin America	6	11
Asia-Pacific	10	9
Africa and Middle East	3	6
Centrally Planned	8	15
World Total	**19**	**23**

Source: FAO, IMF

It is evident that North American consumption is far greater than any other region. There have, however, been substantial increases in most regions over the period. The major exception is the Asia Pacific region due to the significant decline in consumption by Japan.

Particleboard

A comparison of the elements included in the wood based panel data shows the changes that have taken place in the panelboard industry from 1970 to 1985 (Table 1-19).

Table 1-19
Annual Rate of Growth for Production of Wood Based Panels
(per cent/yr.)

	1970-1980	**1980-1985**
Plywood	1.7	2.2
Particleboard	8.0	1.5
Fibreboard	1.2	-0.4
Market Veneer	4.1	0.9

These figures illustrate the dramatic growth in the particleboard industry during the 1970s. This expansion was worldwide but has not been sustained into the 80's due, principally, to economic conditions and also because much of the earlier growth had been [illegible] to substitution for other products. Once this had been achieved, growth becomes [illegible]ted to expansion in the market sector.

Regional patterns are shown in Table 1-20, Table 1-21 and Figure 1-8.

Table 1-20
Annual Rate of Growth for Particleboard Production
(per cent/yr.)

	1970-1980	1980-1985
North America	8.2	5.1
Western Europe	6.6	-1.4
Latin America	14.1	3.7
Asia Pacific	12.6	-0.9
Africa and Middle East	11.6	7.6
Centrally Planned Economies	9.2	3.4

In terms of physical volume, the most dramatic production growth in the 1970s was in Europe (9.4 million cubic metres) and in the Centrally Planned Economies (5.4 million cubic metres). All other areas, including North America, accounted for 7.4 million cubic metres.

It should be noted that the type of particleboard that sustained production in the USA and increased production in Canada differs from the type common in other producing areas. The production of this type of particleboard (waferboard) which is made with waterproof resin and is suitable for structural uses, was approaching 43 per cent of particleboard production by 1980 and 60 per cent by 1985. In the U.S.A., 2 per cent of particleboard production was structural in 1980 and 27 per cent in 1985.

Figure 1-8
Particleboards

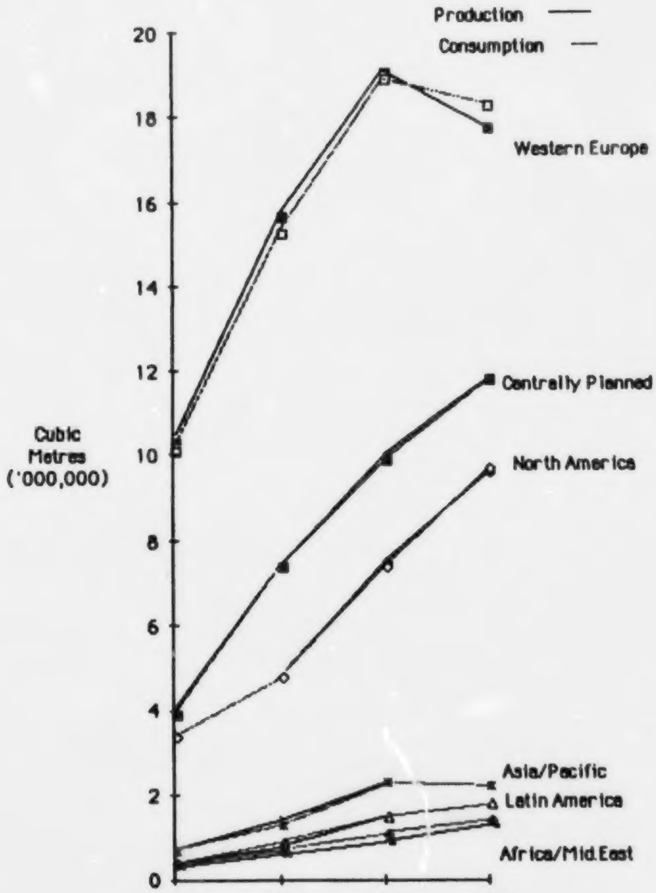


Table 1-21
World Production and Consumption of Particleboard
(million cubic metres)

	Production		1970-85	Consumption		1970-85
	1970	1985	Growth Rate (%/Yr.)	1970	1985	Growth Rate (%/Yr.)
North America	3.4	9.6	7.2	3.4	9.7	7.2
Canada	0.3	2.4	14.9	0.3	1.4	10.8
USA	3.1	7.2	5.8	3.1	8.3	6.8
Western Europe	10.3	17.8	3.7	10.1	18.3	4.0
Scandinavia	1.2	1.9	3.1	1.0	1.5	2.7
Other	9.1	15.9	3.8	9.1	16.8	4.2
Latin America	0.4	1.8	10.5	0.4	1.8	10.5
Brazil	0.1	0.7	13.9	0.1	0.6	12.7
Chile	ns	0.1	10.6	ns	0.1	10.6
Other	0.3	1.0	8.4	0.3	1.1	9.0
Asia Pacific	0.7	2.2	7.9	0.7	2.2	7.9
Japan	0.4	1.2	7.6	0.4	1.2	7.6
Dev. Oceania	0.3	0.8	6.8	0.3	0.8	6.8
Others	ns	0.2	10.6	ns	0.2	10.5
Africa and Middle East	0.3	1.3	10.3	0.4	1.4	8.7
Centrally Planned	4.0	11.8	7.5	3.9	11.8	7.7
USSR	2.0	6.8	8.5	1.8	6.6	9.0
Eastern Europe	2.0	4.8	6.0	2.1	4.9	5.8
China	ns	0.2	13.5	ns	0.3	16.6
Other CP Asia	0.0	ns	na	ns	ns	0.0
World Total	19.1	44.5	5.8	18.9	45.2	6.0

Source: FAO

ns	not significant (less than 0.05)
na	not applicable

Because of the versatility and superior endurance of exterior waferboard type panels we anticipate increased production of these panels in other areas where suitable wood supply is available.

Trade in particleboards does not follow the same pattern described for all wood based panels. Production and consumption for each area are in balance and shipments tend to be restricted to within the producing region. This reflects the acceptability of all types and qualities of wood furnish in the manufacture of particleboards and the high cost of handling and shipment.

Plywood

The pattern of production and consumption of plywood is similar to that shown for all wood based panels. North America, Western Europe and Africa/Middle East are net importers while the Asia Pacific and the Centrally Planned Economies are the principal suppliers (Table 1-22).

However, the USSR alone in the Centrally Planned Economies has increased exports since 1980. The striking growth in production, consumption and exports in the Asia Pacific area is noteworthy. Indonesia is the dominant factor in this development having increased exports from 0.25 to 3.58 million cubic metres during the 1980 to 1985 period. This was principally as a result of government policies relative to the export of logs.

In North America, the USA is again the major producer and user of plywood. Canada is a net exporter. These data are depicted graphically in Figure 1-9.

Table 1-22
World Production and Consumption of Plywood

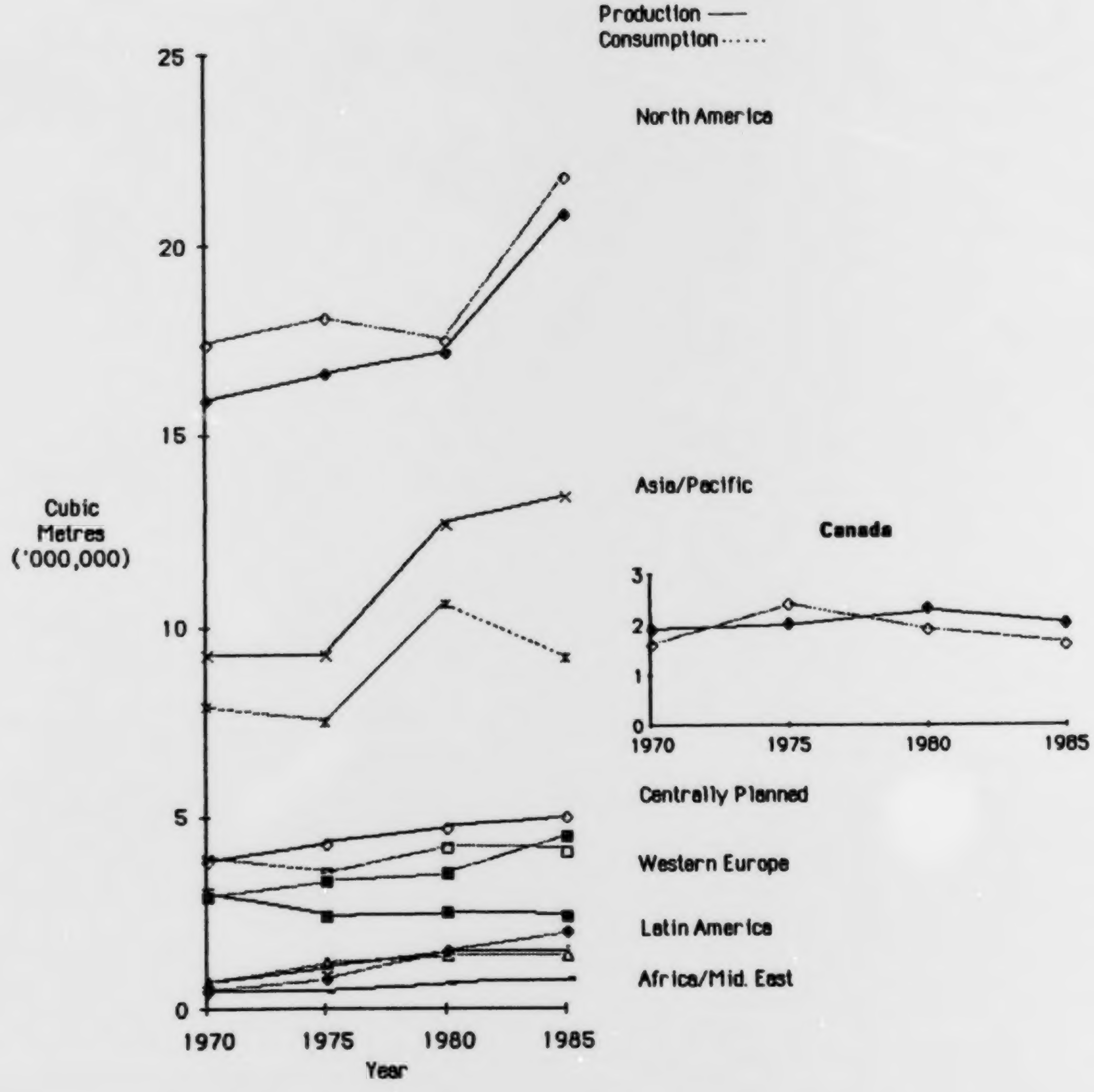
(million cubic metres)

	Production		1970-85	Consumption		1970-85
	1970	1985	Growth Rate (%/Yr.)	1970	1985	Growth Rate (%/Yr.)
North America	**15.9**	**20.8**	**1.8**	**17.4**	**21.8**	**1.5**
Canada	1.9	1.9	0.0	1.6	1.6	0.0
USA	14.0	18.9	2.0	15.8	20.2	1.7
Western Europe	**3.0**	**2.4**	**-1.5**	**3.9**	**4.1**	**0.3**
Scandinavia	0.8	0.7	-0.9	0.4	0.4	0.0
Other	2.2	1.7	-1.7	3.5	3.7	0.4
Latin America	**0.7**	**1.5**	**5.2**	**0.7**	**1.4**	**4.7**
Brazil	0.3	0.9	7.6	0.3	0.9	7.6
Chile	ns	ns	2.9	ns	ns	2.6
Other	0.4	0.6	2.7	0.4	0.5	1.5
Asia Pacific	**9.3**	**13.4**	**2.5**	**7.9**	**9.2**	**1.0**
Japan	6.9	5.1	-2.0	6.8	5.3	-1.6
Dev. Oceania	0.2	0.1	-4.5	0.2	0.2	0.0
Others	2.2	8.2	9.2	0.9	3.7	9.9
Africa and Middle East	**0.5**	**0.8**	**3.2**	**0.5**	**2.0**	**9.7**
Centrally Planned	**3.8**	**5.0**	**1.8**	**2.9**	**4.5**	**3.0**
USSR	2.0	2.4	1.2	1.8	2.0	0.7
Eastern Europe	1.0	0.8	-1.5	0.9	0.8	-0.8
China	0.8	1.8	5.6	0.2	1.7	15.3
Other CP Asia	ns	ns	8.6	ns	ns	0.0
World Total	**33.2**	**43.9**	**1.9**	**33.3**	**43.0**	**1.7**

Source: FAO

ns not significant (less than 0.05)

Figure 1-9
Regional Production and Consumption of Plywood



Fibreboard

Production and consumption of fibreboard are essentially in balance in all areas. Production has increased slightly in the USSR and declined marginally in the USA and Western Europe (Figure 1-10 and Table 1-23). It would appear that the fibreboard industry has matured worldwide and that available fibre will, in future, be allocated to other types of wood based panels.

Figure 1-10
Regional Production and Consumption of Fibreboard

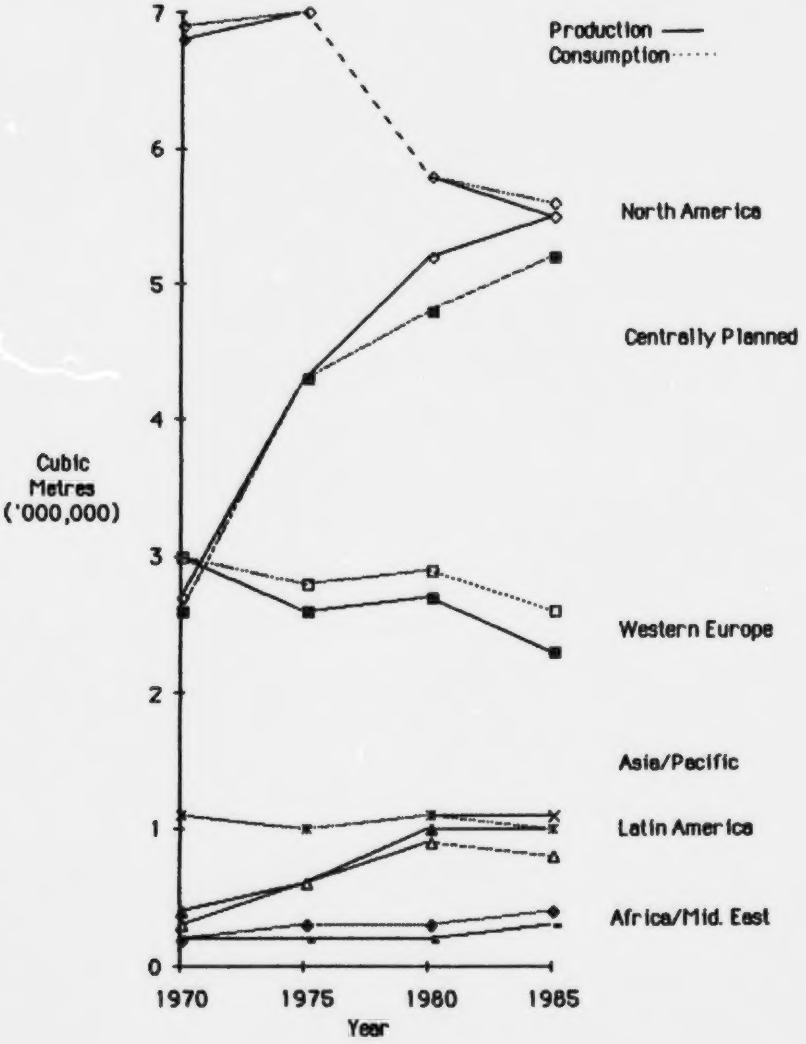


Table 1-23
World Production and Consumption of Fibreboard
(million cubic metres)

	Production		1970-85 Growth Rate (%/Yr.)	Consumption		1970-85 Growth Rate (%/Yr.)
	1970	1985		1970	1985	
North America	**6.8**	**5.5**	**-1.4**	**6.9**	**5.6**	**-1.4**
Canada	1.0	0.8	-1.5	0.9	0.7	-1.7
USA	5.8	4.7	-1.4	6.0	4.9	-1.3
Western Europe	**3.0**	**2.3**	**-1.8**	**3.0**	**2.6**	**-0.9**
Scandinavia	1.7	0.8	-4.9	1.2	0.5	-5.7
Other	1.3	1.5	1.0	1.8	2.1	1.0
Latin America	**0.4**	**1.0**	**6.3**	**0.3**	**0.8**	**6.8**
Brazil	0.3	0.7	5.8	0.2	0.5	6.3
Chile	ns	ns	4.7	ns	ns	9.7
Other	0.1	0.3	7.6	0.1	0.3	7.6
Asia Pacific	**1.1**	**1.1**	**0.0**	**1.1**	**1.0**	**-0.6**
Japan	0.7	0.6	-1.0	0.7	0.6	-1.0
Dev. Oceania	0.3	0.3	-0.0	0.3	0.2	-2.7
Others	0.1	0.2	4.7	0.1	0.2	4.7
Africa and Middle East	**0.2**	**0.3**	**2.7**	**0.2**	**0.4**	**4.7**
Centrally Planned	**2.7**	**5.5**	**4.9**	**2.6**	**5.2**	**4.7**
USSR	1.4	3.2	5.7	1.3	2.9	5.5
Eastern Europe	1.1	1.5	2.1	1.1	1.5	2.1
China	0.2	0.8	9.7	0.2	0.8	9.7
Other CP Asia	ns	ns	0.0	ns	ns	9.7
World Total	**14.2**	**15.7**	**0.7**	**14.1**	**15.6**	**0.7**

Source: FAO
ns not significant

FUTURE PROSPECTS FOR FOREST PRODUCTS

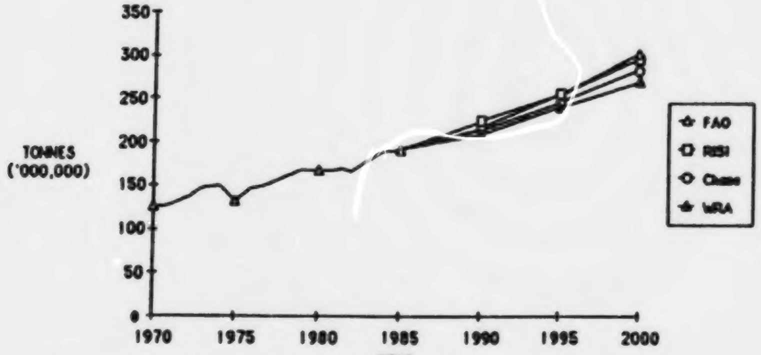
Paper and Paperboard

World paper and paperboard consumption is expected to continue its strong growth pattern, increasing by 78 million tonnes to 270 million tonnes by the year 2000. Although this represents an increase of 41 per cent, or average growth of 2.3 per cent per year, it is lower than the 2.8 per cent per year growth experienced from 1970 to 1985. For comparative purposes, real growth in World GDP has been forecasted to average approximately 3.0 to 3.2 per cent per year to the year 2000, about the same as the average for the 1970 to 1985 period.

It is of note that the most recent FAO forecast prepared in 1985 projects that paper and paperboard demand will be approximately 304 million tonnes by the year 2000. This level of consumption is equal to a 1985 to 2000 average annual growth rate of 3.1 per cent which is in turn equivalent to the GDP growth forecast. In addition, Chase Econometrics and Resource Information Services Inc., two major US forecasting agencies, are also estimating that by the year 2000, consumption will be in the range of 285 to 296 million tonnes. These two projections are equivalent to average annual growth rates of 2.6 and 2.9 per cent respectively. A comparison of these forecasts is shown in Figure 1-11 along with the more conservative forecast prepared by WRA.

Figure 1-11

HISTORIC & PROJECTED
TOTAL PAPER & PAPERBOARD CONSUMPTION



COMPARATIVE PROJECTIONS

MILLIONS OF METRIC TONNES

	1990	1995	2000
FAO	216	255	304
RISI	225	254	297
CHASE	214	246	285
WRA	209	240	270

WRA prefers the more conservative forecast for the following reasons: we have reduced consumption estimates for Western Europe and the South East Asian countries based on our knowledge of supply/demand factors, concerns regarding the availability of economical fibre, and the amount of capital required to build the necessary new facilities, especially in developing countries. In addition, representatives from several major countries on the FAO review committee felt that the gross domestic product (GDP) estimates used as a basis for the demand driven projections were too high (notably Europe and Japan).

Despite WRA's more conservative approach to the consumption forecast, a growth rate of 2.3 per cent in demand still represents a very healthy outlook for the industry. This outlook for good growth is supported by the following factors, all of which tend to increase the demand for paper products.

- After the recessionary period of the early 1980s, the world economic situation is expected to experience steady upward growth. In 1984, consumption in Europe and Japan increased strongly and this trend became observable in N. America during 1985 and 1986.

- Lower inflation rates are forecast over the balance of the 1980s, partly as a result of lower oil prices. This is allowing the oil importing countries to recoup some of the economic wealth which was lost during the 1974 to 1980 period when oil prices escalated dramatically.

- Interest rates should remain at levels which are more conducive to new capital investments. This projection is based on the relatively stable inflation rate forecasts.

- Productivity is rising, in particular, in the developing countries. With it will come increased real income levels and consumer spending.

- World unemployment levels are expected to decrease slowly.

- Lower tariffs should encourage increased exports and trade flows between countries. However, a constraint to be considered is the growth of protectionist legislation which is currently being debated in the U.S.A.

- Improved commodity prices related to economic growth will drive stronger demand for all products including paper and paperboard.

- In the developing countries, in particular Asia, governments are increasing/continuing their strong emphasis on industrialization, higher literacy/education levels, and improved packaging standards relative to increased exports.

- Strong growth in new paper and paperboard capacity is expected in the developing areas to meet the expected increase in demand.

Developing countries, notably in Asia, are expected to experience higher economic growth rates than the industrialized countries to 2000. This will increase demand for not only paper and paperboard products, but for fibre and capital requirements as well. While total consumption is forecast to level off in the industrialized nations, they will still remain growth markets and in particular, for the higher quality papers and paperboards.

Table 1-24 shows the current level of paper and paperboard consumption and the forecast to 1995 and 2000. It has been broken down to show the growth by individual regions.

The highest volume increases in consumption are forecasted to be in Asia-Pacific including China (24.2 million tonnes), North America (21.3 million) and Western Europe (16.1 million).

The greatest increases on a percentage basis are expected to occur in Latin America and Other Asia. Growth in Asia is expected to occur in the People's Republic of China as well as Korea, Taiwan, and other S.E. Asian countries where demand increases for paper products, which are paralleling strong economic growth, are expected to continue.

Table 1-24
Current and Projected Apparent Consumption of Paper and Paperboard by Region

(million tonnes)

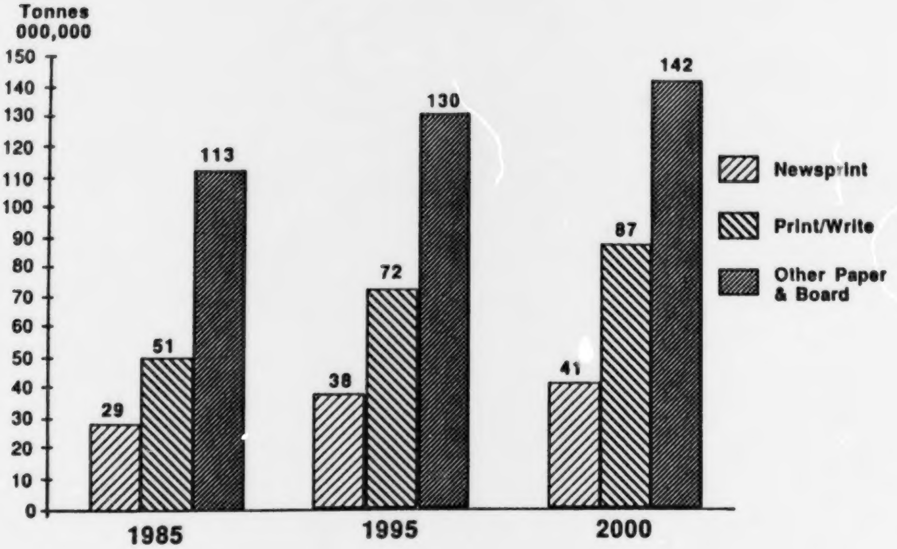
				Volume Change		Avg. Annual Growth	
	1985	1995	2000	1985-1995	1995-2000	1985-1995	1995-2000
						(%/yr.)	
North America	**73.1**	**86.0**	**94.4**	**12.9**	**8.4**	**1.6**	**1.9**
Canada	5.2	6.0	6.9	0.8	0.9	1.4	2.8
USA	67.9	80.0	87.5	12.1	7.5	1.7	1.8
Western Europe	**46.4**	**56.3**	**62.5**	**9.9**	**6.2**	**2.0**	**2.1**
Scandinavia	3.7	4.7	5.2	1.0	0.5	2.4	2.0
Others	42.7	51.6	57.3	8.9	5.7	1.9	2.1
Latin America	**10.4**	**15.2**	**19.4**	**4.8**	**4.2**	**3.9**	**5.0**
Brazil	3.7	5.8	7.6	2.1	1.8	4.6	5.6
Chile	0.3	0.5	0.7	0.2	0.2	5.2	7.0
Others	6.4	8.9	11.1	2.5	2.2	3.4	4.5
Asia-Pacific	**30.8**	**41.4**	**47.3**	**10.6**	**5.9**	**3.0**	**2.7**
Japan	20.3	26.0	29.5	5.7	3.5	2.5	2.6
Dev. Oceania	2.9	3.3	3.8	0.4	0.5	1.3	2.9
Others	7.6	12.1	14.0	4.5	1.9	4.8	3.0
Africa and Middle East	**4.7**	**5.6**	**6.0**	**0.9**	**0.4**	**1.8**	**1.4**
Centrally Planned	**27.2**	**35.5**	**40.4**	**8.3**	**4.9**	**2.7**	**2.6**
USSR	9.7	12.0	13.1	2.3	1.1	2.2	1.8
Eastern Europe	5.9	7.3	8.0	1.4	0.7	2.2	1.9
China	11.4	15.9	18.9	4.5	3.0	3.4	3.5
Other CP Asia	0.2	0.3	0.4	0.1	0.1	4.1	5.9
World Total	**192.6**	**240.0**	**270.0**	**47.4**	**30.0**	**2.2**	**2.4**

Source: WRA

As the Latin American production of wood pulp grows due to an increased availability of low cost plantation fibre resources, this will lead to further development of the paper and paperboard industry. On balance, this new paper and paperboard production will be absorbed by the Latin American market.

Figure 1-12 shows the breakdown of consumption by major grade segments projected to the year 2000.

Figure 1-12
World Paper & Paperboard Consumption
By Product 1985-2000



Of the paper/paperboard categories, the fastest growing segment is expected to be the printing and writing grades. They are forecast to increase to 87 million tonnes from 51 million tonnes; an increase of 36 million tonnes stemming from a growth rate of 3.6 per cent per year. Newsprint grades are expected to grow by 12 million tonnes to 41 million tonnes (2.3% per year). Other paper and paperboard will grow by 29 million tonnes to 142 million tonnes, remaining the largest volume segment of paper and paperboard consumption but having the lowest rate of growth (1.6% per year).

Incremental demand in the major industrialized regions (North America, W. Europe and Japan) will continue to trend towards the higher valued products such as printing and writing papers. The market is more mature in these regions and consumption of some grades, notably newsprint and linerboard has slowed. The paper industry is very capital intensive and the real cost of capital has increased dramatically since 1970. Companies in the higher fibre cost regions will closely examine the economics of new capital expenditures. In order to maximize return on investment and to satisfy consumer demands for new products, paper producers will continue to seek and develop technological improvements which help to keep production cost increases to a minimum. In addition to high capital costs for new mills and equipment, the industrialized countries will experience increasing fibre supply, energy, labour and transportation costs. This will also act as an incentive to find new, lower cost substitutes for existing products and paper furnish mix components.

The developing countries such as Latin America and Africa will strive to produce as much of their own paper requirements as is possible. However, due to the expected large increases in consumption, there will still be a significant deficiency to be filled by increased imports. The main emphasis in these countries will be to take the first steps towards utilization of the available lower cost fibre and labour resources. In the shorter term, most development is expected to occur in pulp production. This will allow the most cost effective usage of their economic fibre resources which are mainly from plantation sources.

However, paper and board production is expected to increase as well. This is especially true in Latin American countries such as Brazil and Chile which already have existing pulp production facilities and are currently producing a limited variety of paper and paperboard grades.

In most of the developing countries, it is expected that paper production will initially emphasize the lower value-added paper products such as newsprint, linerboard, wrapping and packaging grades. These require lower capital outlays and less sophisticated levels of technology than higher grade products such as printing and writing papers.

In addition, as the industrialized nations emphasize higher value products and move away from the lower valued grades, domestic market opportunities will become available to imports. It is expected that in addition to pulp, an increasing volume of low cost fibre based, lower value added papers and paperboards will be exported from developing nations to the industrialized world.

Projected Regional Production

The major producing regions will continue to be North America and Western Europe accounting for 64 per cent of total production by 2000. This compares with 65 per cent in 1985 and 72 per cent in 1970 (Table 1-25).

Latin America, Asia-Pacific and the centrally planned countries are forecasted to show significant production increases but, as is shown by Table 1-26 these increases are not expected to keep pace with domestic demand.

Table 1-25
Current and Projected Production of Paper and Paperboard by Region
(million tonnes)

				Volume Change		Avg. Annual Growth	
	1985	1995	2000	1985-1995	1995-2000	1985-1995 (%/yr.)	1995-2000
North America	**75.4**	**93.5**	**101.9**	**18.1**	**8.4**	**2.2**	**1.7**
Canada	14.5	17.8	19.7	3.3	1.9	2.1	2.0
USA	60.9	75.7	82.2	14.8	6.5	2.2	1.7
Western Europe	**50.2**	**62.2**	**70.8**	**12.0**	**8.6**	**2.2**	**2.6**
Scandinavia	16.1	20.6	23.3	4.5	2.7	2.5	2.5
Others	34.1	41.6	47.5	7.5	5.9	2.0	2.7
Latin America	**9.4**	**12.6**	**15.7**	**3.2**	**3.1**	**3.0**	**4.5**
Brazil	4.1	6.3	8.3	2.2	2.0	4.4	5.7
Chile	0.4	0.7	0.9	0.3	0.2	5.8	5.2
Others	4.9	5.6	6.5	0.7	0.9	1.3	3.0
Asia-Pacific	**28.2**	**38.0**	**43.8**	**9.8**	**5.8**	**3.0**	**2.9**
Japan	20.5	24.2	27.5	3.7	3.3	1.7	2.6
Dev. Oceania	2.3	3.1	3.5	0.8	0.4	3.0	2.5
Others	5.4	10.7	12.8	5.3	2.1	7.1	3.6
Africa and Middle East	**2.8**	**3.1**	**3.7**	**0.3**	**0.6**	**1.0**	**3.6**
Centrally Planned	**26.8**	**30.6**	**34.1**	**3.8**	**3.5**	**1.3**	**2.2**
USSR	10.1	11.4	12.3	1.3	0.9	1.2	1.5
Eastern Europe	5.6	8.1	8.7	2.5	0.6	3.8	1.4
China	11.0	11.0	13.0	-	2.0	-	3.4
Other CP Asia	0.1	0.1	0.1	-	-	-	-
World Total	**192.8**	**240.0**	**270.0**	**47.2**	**30.0**	**2.2**	**2.4**

Source: WRA

Regional Self-Sufficiency

North America and Scandinavia are expected to increase their surpluses of paper and paperboard products significantly by the year 2000 (Table 1-26).

The USA, the largest paper producer, will continue to utilize a portion of its existing and expected increase in industrial roundwood and residual supplies to increase paper production. In addition they will continue to purchase wood pulp from other supplier countries such as Canada and Latin America. These fibre sources are expected to result in an average production increase of 2.0 per cent per year to 1995. At the same time consumption is expected to increase at a lower rate (1.7 per cent) due to several factors including:

1. lower expectations for GDP growth
2. relative maturity of paper grades such as newsprint
3. increased grade replacement by plastics
4. continued reduction in basis weights and sheet sizes.

Canada will continue to utilize its fibre base by increasingly moving toward production of higher valued paper grades to meet the expected demand growth in Western Europe and Asia and to provide optimum returns on investment.

Due to their relatively high fibre costs, the Scandinavian countries are expected to continue to integrate more pulp capacity into paper production so that the wood component represent a smaller portion of the end product cost. Most of this increased production is expected to be marketed in Western Europe.

Latin American countries are expected to increase production significantly. But, consumption should increase at an even higher rate as a result of increased emphasis on educational, advertising and business papers. In addition, the expected growth in exports of packaged products such as electronic components, auto parts, etc. will require an increased volume of packaging materials.

The Asia-Pacific region is expected to show the largest growth of any region in GDP over the forecast period. This should result in a continued growth in exports of packaged products to the industrialized countries as well as increased advertising, business and educational paper usage.

The centrally planned countries, in particular the People's Republic of China, are expected to increase consumption of paper and paperboard products significantly as a result of educational and economic factors. While they will endeavour to produce internally as much of their requirements as possible, consumption is projected to outstrip production.

Table 1-26
Current and Projected Regional Self-Sufficiency for Paper and Paperboard
(million tonnes)

	Apparent Surplus or (Deficit)			Projected Change	
	1985	1995	2000	1985-95	1995-2000
North America	**2.3**	**7.5**	**7.5**	**+5.2**	**---**
Canada	9.3	11.8	12.8	+2.5	+1.0
USA	(7.0)	(4.3)	(5.3)	+2.7	-1.0
Western Europe	**3.8**	**5.9**	**8.3**	**+2.1**	**+2.4**
Scandinavia	12.4	15.9	18.1	+3.5	+2.2
Others	(8.6)	(10.0)	(9.8)	-1.4	+0.2
Latin America	**(1.0)**	**(2.6)**	**(3.7)**	**-1.6**	**-1.1**
Brazil	0.4	0.5	0.7	+0.1	+0.2
Chile	0.1	0.2	0.2	+0.1	-
Others	(1.5)	(3.3)	(4.6)	-1.8	-1.3
Asia-Pacific	**(2.6)**	**(3.4)**	**(3.5)**	**-0.8**	**-0.1**
Japan	0.2	(1.8)	(2.0)	-2.0	-0.2
Dev. Oceania	(0.6)	(0.2)	(0.3)	+0.4	-0.1
Others	(2.2)	(1.4)	(1.2)	+0.8	+0.2
Africa and Middle East	**(1.9)**	**(2.5)**	**(2.3)**	**-0.6**	**+0.2**
Centrally Planned	**(0.4)**	**(4.9)**	**(6.3)**	**-4.5**	**-1.4**
USSR	0.4	(0.6)	(0.8)	-1.0	-0.2
Eastern Europe	(0.3)	(0.8)	(0.7)	-1.1	-1.0
China	(0.4)	(4.9)	(5.9)	-4.5	-1.0
Other CP Asia	(0.1)	(0.2)	(0.3)	-0.1	-0.1
World Total	**0.2***	**0**	**0**		

Source: WRA

* inventory change

Woodpulp and Other Fibres

The increased production of paper and paperboard identified in the previous section will result in an increased demand for woodpulp and other fibre sources including recycled waste paper and smaller volumes of agricultural residues (bagasse) and non-wood fibres (reeds, bamboo, etc.).

Woodpulp Consumption

Technological changes will affect the volumes and grades of woodpulp to be consumed in the paper furnish. These anticipated changes are summarized as follows:

1) Increased usage of higher yield (mechanical) pulps
2) Increased usage of hardwood kraft pulps
3) Increased usage of recycled waste papers
4) Increased usage of filling and coating agents.

The last two of these changes will allow the volume of woodpulp consumed to be reduced on a per tonne of finished paper basis. The expected decrease in pulp used as a percentage of finished paper and paperboard production is illustrated as follows:

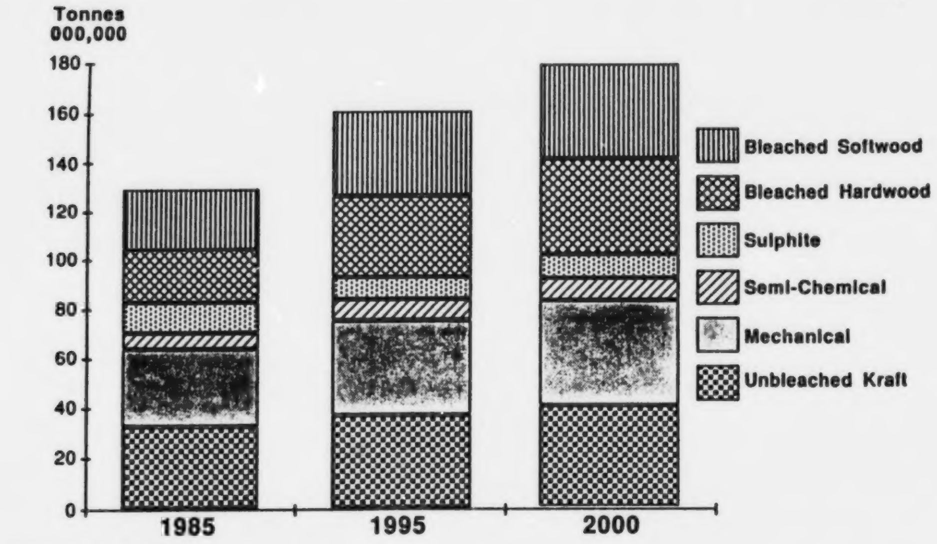
Estimated Woodpulp as a Percentage of Paper Production
(millions of tonnes)

	1985	1995	2000
Paper and Paperboard Production	192.8	240.0	270.0
Estimated Woodpulp Consumption	129.4	160.8	179.5
Woodpulp used as a Percentage of Finished Paper and Paperboard	67.1	67.0	66.5

Source: WRA

Figure 1-13 illustrates the expected consumption of paper grade woodpulp to the year 2000 by individual grade. Usage by grade is outlined in Table 1-27.

Figure 1-13
World Paper Grade Wood Pulp Consumption
1985 - 2000



Source: FAO, WRA

Table 1-27
World Paper Grade Woodpulp Consumption
(million tonnes)

	1985	1995	2000	Volume Change 1985-1995	Volume Change 1995-2000	Avg. Annual Growth 1985-1995 (%/yr.)	Avg. Annual Growth 1995-2000 (%/yr.)
Bleached Kraft							
- Softwood	25.1	34.4	38.9	9.3	4.5	3.2	2.5
- Hardwood	21.1	33.1	39.2	12.0	6.1	4.6	3.4
Sulphite	12.4	9.4	9.2	(3.0)	(0.2)	(2.7)	(0.4)
Unbleached Kraft	33.1	36.9	39.9	3.8	3.0	1.1	1.6
Semi-chemical	7.2	8.6	9.4	1.4	0.8	1.8	1.8
Total Chemical	**98.9**	**122.4**	**136.6**	**23.5**	**14.2**	**2.2**	**2.2**
Mechanical	**30.5**	**38.4**	**42.9**	**7.9**	**4.5**	**2.3**	**2.2**
Total Woodpulp	**129.4**	**160.8**	**179.5**	**31.4**	**18.7**	**2.2**	**2.2**

Source: WRA

As Table 1-27 illustrates, kraft pulps will continue to be the largest volumes consumed in paper production. Consumption of bleached hardwood kraft is projected to continue to grow at a faster pace than other grades of woodpulp and is expected to surpass the usage of softwood kraft by the year 2000.

The Latin American countries are forecasted to supply an increasing volume of new hardwood timber resources from eucalyptus plantations. The relatively fast growth period for this species provides a decided advantage over competing species. Pulpwood can be obtained from eucalyptus plantations in as little as 6 to 7 years compared to significantly longer periods of time for other hardwoods and softwoods. In addition to the advantage of faster growth periods, eucalyptus has also become a desirable species for papermaking due to its technical qualities. This trend is projected to continue and more plantation establishments of eucalyptus are expected in the Latin American countries.

The usage of higher yield mechanical pulps is also expected to increase. These pulps include thermomechanical (TMP) and chemi-thermomechanical (CTMP) pulps which have been developed over the last 10 years and production has been increasing. Initially, only softwood fibres were used (TMP) but the commercialization of the CTMP process and the growing desirability of using hardwood fibres has lead to the production of mixed wood (e.g. spruce/aspen) CTMP's. Regions with low power costs and fibre resources which were previously considered to be undesirable or uneconomic (i.e. aspen) for the production of pulp are now growth centres for high quality bleached high yield pulps (BCTMP). Scandinavia and North America are the major regions which currently produce the majority of high yield pulps. While the technology is suitable for other regions including Europe and Asia, it requires extremely high power consumption which may preclude its usage in high power cost regions.

Table 1-28 outlines the apparent paper grade woodpulp consumption by region expected for the 1985 to 2000 period. North America and Western Europe are forecasted to continue to be the largest consumers of woodpulp. Significant increases in consumption, related to the expected increases in paper and paperboard production, are also expected in Asia Pacific, Latin America and the Centrally Planned region.

Table 1-28
Paper Grade Woodpulp Consumption
By Region
(million tonnes)

	1985	1995	2000	Volume Change 1985-1995	Volume Change 1995-2000	Avg. Annual Growth 1985-1995 (%/yr.)	Avg. Annual Growth 1995-2000 (%/yr.)
North America	62.6	75.0	80.0	12.4	5.0	1.8	1.3
Western Europe	31.9	39.2	44.5	7.3	5.3	2.1	2.6
Latin America	4.6	7.4	10.2	2.8	2.8	4.9	6.6
Asia-Pacific	15.2	20.4	24.2	5.2	3.8	3.0	3.5
Africa and Middle East	1.5	2.3	2.6	0.8	0.3	4.4	2.5
Centrally Planned	13.6	16.5	18.0	2.9	1.5	2.0	1.8
World Total	**129.4**	**160.8**	**179.5**	**31.4**	**18.7**	**2.2**	**2.2**

Source: WRA

Woodpulp Production

Table 1-29 illustrates the anticipated changes in paper grade woodpulp production by region. North America will continue to be the largest producer of woodpulp, however, significant increases are expected to occur in Latin America related to the availability of low cost industrial roundwood from hardwood (Brazil) and softwood (Chile) plantations. Other increases are foreseen for Western Europe (Spain and Portugal for hardwoods and Northern Europe for softwoods), Asia-Pacific (mainly from maturing plantations in Oceania), and the Centrally Planned countries (mainly the USSR from natural forests).

Table 1-29
Paper Grade Woodpulp Production
By Region
(million tonnes)

	1985	1995	2000	Volume Change 1985-1995	Volume Change 1995-2000	Avg. Annual Growth 1985-1995 (%/yr.)	Avg. Annual Growth 1995-2000 (%/yr.)
North America	68.3	82.2	90.6	13.9	8.4	1.9	2.0
Western Europe	28.9	35.3	37.8	6.4	2.5	2.0	1.4
Latin America	5.8	10.0	14.0	4.2	4.0	5.6	7.0
Asia-Pacific	12.3	14.8	16.5	2.5	1.7	1.9	2.2
Africa and Middle East	2.0	2.2	2.6	0.2	0.4	1.0	3.4
Centrally Planned	13.7	16.2	18.0	2.5	1.8	1.7	2.1
World Total	**131.0**	**160.7**	**179.5**	**29.7**	**18.8**	**2.1**	**2.2**

Source: WRA

Regional Self-Sufficiency

The estimated regional surplus or (deficit) position is shown in Table 1-30. The surplus position of North American woodpulp producers should increase further beyond 1995 as more usage is made of available hardwoods through expansions of existing mills and the establishment of new greenfield capacity for chemi-mechanical and chemical pulps.

Western Europe's deficit position is expected to increase as a result of a movement to increase paper production in the Scandinavian countries. Utilizing more domestic pulp production will leave less available for other Western European paper producers.

The Asia-Pacific regional pulp deficit is projected to increase due to a relative increase in the production of paper and paperboard.

Table 1-30
Current and Projected Regional Self-Sufficiency for Paper Grade Wood Pulp
(million tonnes)

	Apparent Surplus or (Deficit)			Projected Change	
	1985	1995	2000	1985-95	1995-2000
North America	5.7	7.2	10.6	+1.5	+3.4
Western Europe	(3.0)	(3.9)	(6.7)	-0.9	-2.8
Latin America	1.2	2.6	3.8	+1.4	+1.2
Asia-Pacific	(2.9)	(5.6)	(7.7)	-2.7	-2.1
Africa and Middle East	0.5	(0.1)	-	-0.6	+0.1
Centrally Planned	0.1	(0.3)	-	-0.4	+0.3

Source: WRA

Sawnwood Products

Global Overview

World consumption of lumber products is expected to increase at an average rate of 1.4 per cent per annum over the remainder of this century as compared to only 0.5 per cent per annum during the 1970 to 1985 period. This apparently dramatic increase in consumption is partially explained by the fact that in the 1985 terminal/base year, lumber consumption was still suffering the effects of the 1981 to 1983 recession and had not yet recovered to the previous peaks recorded during the 1979 to 1980 period. Significant recovery did occur in 1985 and 1986. When world consumption is viewed over the entire 1970 to 2000 period, the apparent growth rate becomes 1.15 per cent per year (Figure 1-14).

World use of hardwood lumber products is projected to expand at 2.0 per cent per year, a rate which is considerably in excess of the average annual 1.3 per cent projected for softwood. The majority of the world's hardwood resources are found in the developing world and this is where the pace of economic expansion is expected to be greatest (Figure 1-15). An exception is Western Europe (excluding Scandinavia) where strong growth in hardwood demand is forecast. In terms of volume, however, incremental demand for softwood lumber products at 70 million m^3 is projected to be 1.8 times greater than that for hardwood (34.0 million m^3). Over 80 per cent of this incremental softwood demand is expected to come from the industrialized nations plus China and the USSR. That is, from the regions that contain the vast majority of the world's softwood resources. Projected incremental consumption of lumber products by region is depicted in Figure 1-15 and Table 1-31.

Figure 1-14
Historical & Projected Total Lumber Consumption

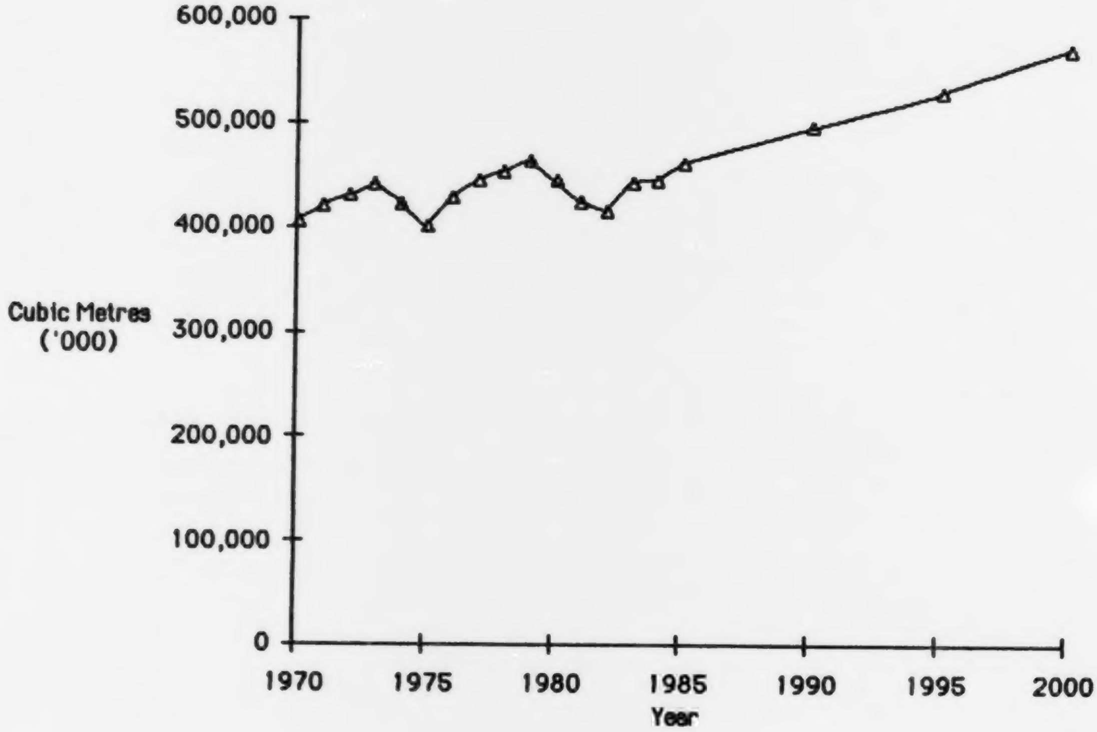


Table 1-31

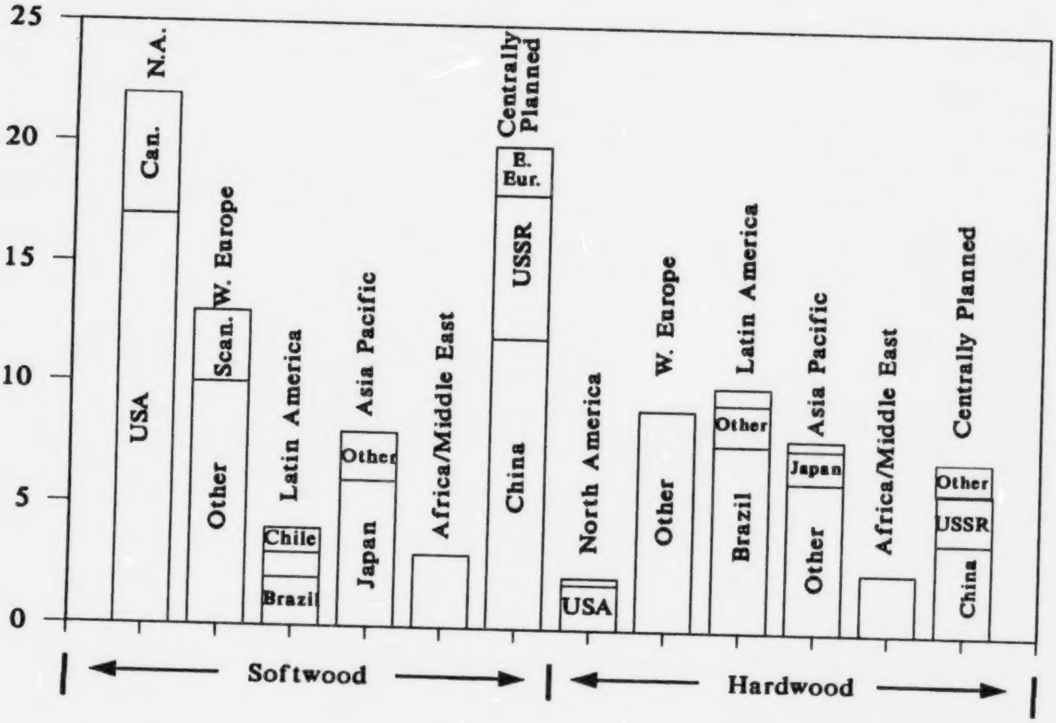
Current and Projected World Consumption - Lumber

(million cubic metres)

	1985	2000	Annual Growth %/yr.
North America	133	157	1.1
Canada	16	21	1.8
US	117	136	1.0
Western Europe	69	91	1.9
Scandinavia	9	11	1.3
Others	60	80	1.9
Latin America	27	41	2.8
Brazil	16	26	3.3
Chile	1	3	4.7
Others	10	12	1.2
Asia-Pacific	73	89	1.3
Japan	34	41	1.3
Dev. Oceania	6	7	1.0
Others	33	41	1.5
Africa/Mid East	19	23	1.3
Centrally Planned	141	169	1.2
USSR	90	98	0.6
Eastern Europe	22	25	0.8
China	28	44	3.0
Other CP Asia	1	2	4.7
Total	462	570	1.4

Source: FAO, WRA

Figure 1-15
1985 - 2000
Projected Incremental Consumption of Lumber Products by Region
(million m^3)



Canada is expected to remain the world's principal exporter of softwood lumber and the availability for export, after satisfying domestic consumption, is expected to increase by 2 million m^3 over the 1985 level. This increase is apparently offset by additional US demand but it is possible that supply from other surplus regions such as Chile could be exported to the US thus allowing incremental Canadian exports to other deficit regions.

The areas which demonstrate the greatest increase in deficit are Western Europe, China and Japan. There is not expected to be any increase in lumber production in Scandinavia and, though substantial production increases are expected in other Western European countries, there will be a growing need for imports by Western Europe. As shown in Table 1-32 the likely suppliers will be Developed Oceania, Chile and USSR/ Eastern Europe. In addition it is clear that China could emerge as an important market for exported lumber.

The Asian nations (other than Japan) will continue to be the leading exporters of hardwood lumber products but, by 2000, Latin America and the United States will have become important factors in the hardwood export trade. On the import side, the most significant change is the large increase in the deficits projected for Western Europe where net import requirements are projected to increase from 3.0 million m^3 in 1985 to 10 million m^3 by the year 2000. In addition Japanese import requirements for hardwood lumber also will increase. It is projected that there will be substantially more processing of logs in the country of origin rather than log export.

Table 1-32
Self Sufficiency Projections for Lumber Products
(million cubic metres)

	Apparent Surplus or (Deficit)				Projected Change	
	1985		2000		1985-2000	
	Swd	Hwd	Swd	Hwd	Swd	Hwd
North America	**7.8**	**(0.2)**	**8**	**3**	**-**	**+3**
Canada	38.0	(0.3)	40	-	+2	-
United States	(30.2)	0.1	(32)	3	-2	+3
Western Europe	**(2.0)**	**(3.2)**	**(10)**	**(10)**	**-8**	**-7**
Scandinavia	12.4	(0.2)	11	-	-1	-
Others	(14.4)	(3.0)	(21)	(10)	-7	-7
Latin America	**(0.8)**	**0.2**	**2**	**5**	**+3**	**+5**
Brazil	0.1	0.1	(1)	3	-1	+3
Chile	0.7	-	4	-	+3	-
Others	(1.6)	0.1	(1)	2	+1	+2
Asia-Pacific	**(4.7)**	**3.5**	**(4)**	**3**	**+1**	**-1**
Japan	(4.1)	(1.1)	(7)	(3)	-3	-2
Dev. Oceania	(0.6)	(0.3)	2	(1)	+3	-1
Others	-	4.9	1	7	+1	+2
Africa and Middle East	**(6.2)**	**(0.5)**	**(5)**	**(1)**	**+1**	**-**
Centrally Planned	**6.6**	**(0.4)**	**9**	**-**	**+2**	**-**
USSR	7.4	(0.1)	12	-	+5	-
Eastern Europe	(0.9)	0.2	1	1	+1	+1
China	-	(0.5)	(4)	(1)	-4	-1
Other CP Asia	0.1	-	-	-	-	-

Source: FAO, WRA

Softwood Sawnwood

Consumption

The overall outlook for softwood lumber consumption worldwide over the next 15 years (Figure 1-16) is for some further growth - equivalent to 1.2 per cent per annum. This rate of increase is somewhat greater than had been apparent in the past fifteen years and the details for each region are shown in Table 1-33. Briefly, the rationale for the regional projections

- North American growth will continue but at only half the rate of the previous period. Housing starts are expected to be well below those currently prevalent but use in industry and repairs and renovations will increase.

- Western European consumption is expected to be strong with a substantial recovery from the low levels of the early 1980s. The major factors that influence this change to an increase in consumption compared to the recent trends of a decline are the following:

    - level of residential investment
    - technical and economic competitiveness of sawn wood
    - changes in consumer habits
    - macro-economic growth coupled with population increases.

- Consumption in Japan will recover from the declines that have occurred over the past 15 years. Housing starts are expected to be reasonably strong and, though the decline in traditional wood based housing is likely to continue there are some offsetting factors:

    - increase in the popularity of platform frame housing
    - more repairs and renovations
    - an increase in the use of lumber in engineered wood design.

- Some growth is expected in Korea but other Asian Pacific countries are expected to remain relatively minor consumers of softwood lumber.

Figure 1-16
Historical & Projected Worldwide Softwood Lumber Consumption
(thousands m^3)

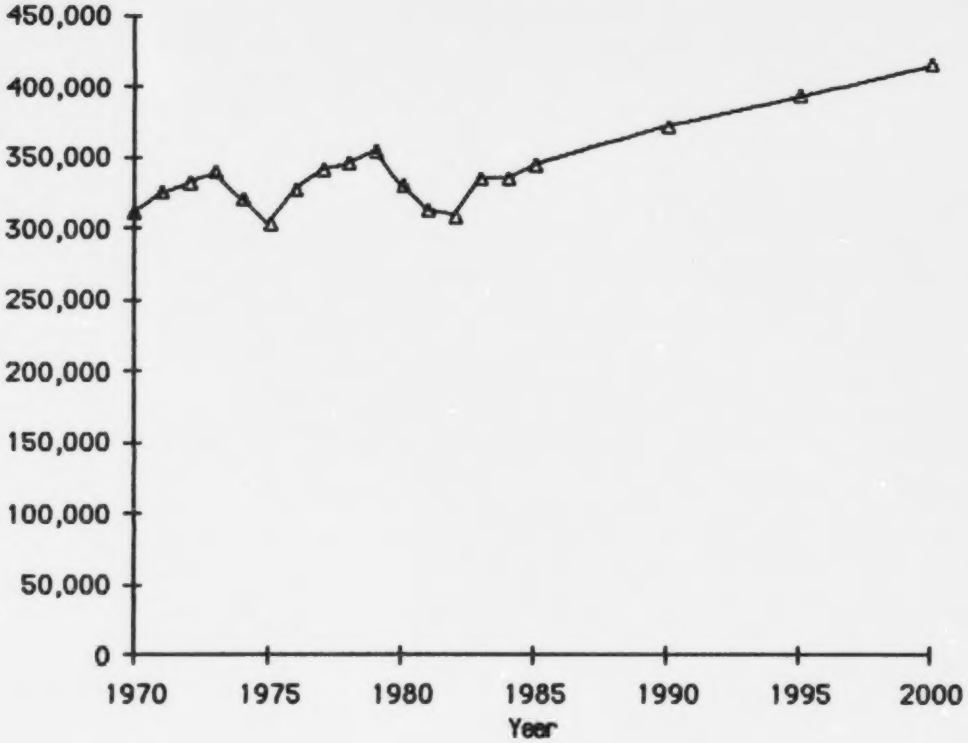


Table 1-33
Projected Softwood Lumber Consumption
(million cubic metres)

	1995	2000	Annual Growth (%/yr.)	Volume Change
North America	137	139	1.1	22
Canada	18	19	1.8	5
US	119	120	1.0	17
Western Europe	64	67	1.4	13
Scandinavia	11	11	1.7	3
Other	53	56	1.3	10
Latin America	15	17	1.8	4
Brazil	8	10	2.0	2
Chile	2	2	3.5	1
Other	5	5	0.9	1
Asia Pacific	42	44	1.3	8
Japan	33	34	1.3	6
Dev. Oceania	4	4	0.2	-
Others	5	6	2.1	2
Africa and Middle East	13	14	1.1	3
Centrally Planned	122	132	1.1	20
USSR	80	84	0.5	6
Eastern Europe	17	18	0.7	2
China	24	29	3.5	12
Other CP Asia	1	1	3.5	-
World Total	393	413	1.2	69

Source: WRA

- Latin American consumption will continue to increase but the bulk of the increase will be in the areas where there is production i.e. Brazil and Chile. Per capita consumption in other areas is expected to remain low due to traditional building practices.

- Consumption in Africa/Middle East is largely dependent on the oil economies. It is assumed that these will recover in the 1990's and some growth in consumption will follow.

- The USSR has consumed decreasing volumes of softwood lumber in recent years. This decline has been partly as a result of substitution of panelboards. It is believed that this substitution has now largely taken place and some small growth can be expected. The most recent estimates for 1987 by USSR officials already indicate a substantial recovery from the low 1984/85 levels.

- Projections for demand in Eastern Europe by FAO and Chase, indicated a dramatic growth potential. It is believed, however, that the more modest outlook suggested by ETTS IV is more likely.

- The potential for softwood lumber consumption in China is substantial. The projections used are conservative relative to what could occur if official policies change.

Production

The production to meet the demand projections made in the previous section is expected to be developed in all the major softwood producing regions. The principal aspects of the projections are:

- North American supply will grow marginally above demand increasing the availability for export.

- Substantial increases are expected in softwood lumber production in countries such as France and Germany but, overall, these will be below the increase in demand.

- There will be a substantial increase in production in Chile but Brazil is not expected to develop softwood lumber production at a similar rate.

- Japanese domestic production will increase and this will be increasingly based on domestic timber rather than on log imports. The structure of the sawmilling industry is likely to change to fewer but larger more efficient operations.

- Softwood lumber production in New Zealand will increase significantly over the period, together with some increases in Australia.

- USSR production will be increased substantially in order to accommodate increased domestic demand and maintain exports to earn hard currency.

- Modernization of the Chinese sawmilling industry could result in a very great expansion in production provided the log supply is forthcoming.

The regional outlook for production is shown in Table 1-34.

Table 1-34
Softwood Lumber Production
(million cubic metres)

	1985	1995	2000
North America	124.9	147	147
Canada	52.5	59	59
US	72.4	88	88
Western Europe	52.3	55	57
Scandinavia	20.9	22	22
Other	31.4	33	35
Latin America	12.2	16	19
Brazil	7.5	8	9
Chile	1.9	4	6
Other	2.8	4	4
Asia Pacific	31.6	37	40
Japan	23.9	26	27
Dev. Oceania	3.3	5	6
Others	4.4	6	7
Africa and Middle East	5.6	8	9
Centrally Planned	118.4	130	141
USSR	84.9	91	96
Eastern Europe	15.4	18	19
China	17.4	20	25
Other CP Asia	0.7	1	1
World Total	345.0	393	413

Source: WRA

Hardwood Sawnwood Projections

Consumption

At 1.1 per cent per annum, hardwood lumber consumption increased relatively slowly over the past 15 years but it is believed that this rate is likely to nearly double to 2.0 per cent over the next 15 years (Figure 1-17 and Table 1-35). The estimate is based on 4the following general concepts.

- The increased harvest of hardwoods for pulp in the US will lead to the greater availability of saw timber. Furthermore, new processing technologies will provide consumers with products designed for their requirements.
- A strong recovery is foreseen in the consumption of hardwoods in Europe.
- Latin American consumption will increase due to a greater focus on secondary manufacturing, and as a result of economic improvements.
- Substantial growth is also expected in the Asia Pacific countries as they develop a larger secondary processing capability.
- A recovery in the oil producing economies will increase the consumption of hardwood lumber in the Middle East.
- The demand in China will increase.

Figure 1-17
Historical and Projected Worldwide
Hardwood Lumber Consumption
(thousands m^3)

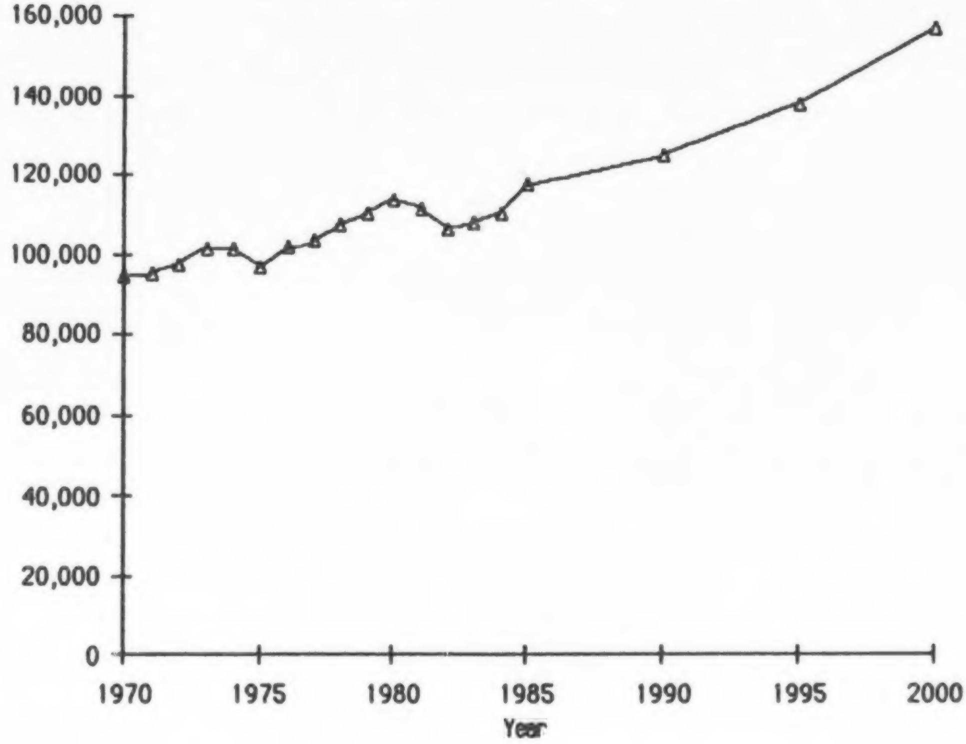


Table 1-35
Hardwood Lumber Consumption
(million cubic metres)

	1985	1995	2000	Annual Growth (%/yr.)	Volume Change
North America	**15.8**	17.0	**18.0**	0.9	2.2
Canada	1.7	2.0	2.0	1.1	0.3
US	14.1	15.0	16.0	0.8	1.9
Western Europe	**14.9**	20.0	**24.0**	3.2	9.1
Scandinavia	0.4	0.4	0.4	0.0	0.0
Other	14.5	19.6	23.6	3.3	9.1
Latin America	**13.9**	19.0	**24.0**	3.7	10.1
Brazil	8.3	13.0	16.0	4.5	7.7
Chile	0.3	0.5	1.0	8.4	0.7
Other	5.3	5.5	7.0	1.9	1.7
Asia Pacific	**36.5**	40.0	**44.5**	1.3	8.0
Japan	5.6	6.4	7.0	1.5	1.4
Dev. Oceania	2.1	2.1	2.5	1.2	0.4
Others	28.8	31.5	35.0	1.3	6.2
Africa and Middle East	7.0	8.5	9.5	2.1	2.5
Centrally Planned	29.4	32.5	37.0	1.5	7.6
USSR	12.2	13.0	14.0	0.9	1.8
Eastern Europe	6.0	6.5	7.0	1.0	1.0
China	10.8	12.3	15.0	2.2	4.2
Other CP Asia	0.4	0.7	1.0	6.3	0.6
World Total	**117.5**	**137.0**	**157.0**	**2.0**	**39.5**

Source: WRA

Production

The principal area of production growth in hardwood lumber is expected to be Latin America which will account for more than one third of the increment. Projections by region are shown in Table 1-36.

Though the growth in production in Western Europe is well below that of projected consumption it is, nevertheless, greater than might be expected based on the availability of raw material. It is believed, however, that the recovery in demand levels will result in a greater utilization of hardwoods - possibly of species and qualities that had previously been considered uneconomic.

It is also worth noting that the production increases in countries such as Indonesia and Malaysia cannot be based on traditional species. Lesser known timber and possibly some part of the plantation wood grown for pulp will become of greater significance.

In Africa it is assumed that a similar trend will occur. In addition, it is likely that there will be a reduction in the export of saw timber quality logs and a corresponding increase in lumber production. The increases are not likely to be substantial, however, due to resource limitations.

In North America it is likely that there will be some growth in the production of lumber products based on low value hardwoods such as aspen and other poplar species. It is felt, however, that this growth will be relatively low within the scale of numbers considered (i.e. to the nearest 1 million m^3) and be confined to small scale operations producing specialty products of various types.

Table 1-36
Hardwood Lumber Production
(million cubic metres)

	1985	1995	2000	Annual Growth (%/yr.)	Volume Change
North America	**15.6**	**19.5**	**20.5**	**1.8**	**4.9**
Canada	1.4	1.5	1.5	0.5	0.1
US	14.2	18.0	19.0	2.0	4.8
Western Europe	**11.7**	**12.8**	**14.4**	**1.4**	**2.7**
Scandinavia	0.2	0.3	0.4	4.7	0.2
Other	11.5	12.5	14.0	1.3	2.5
Latin America	**14.1**	**22.0**	**29.0**	**4.9**	**14.9**
Brazil	8.4	14.0	19.0	5.6	10.6
Chile	0.3	1.0	1.0	8.4	0.7
Other	5.4	7.0	9.0	3.5	3.6
Asia Pacific	**40.0**	**44.0**	**48.0**	**1.2**	**8.0**
Japan	4.5	4.0	4.0	-0.8	-0.5
Dev. Oceania	1.8	2.0	2.0	0.7	0.2
Others	33.7	38.0	42.0	1.5	8.3
Africa and Middle East	**6.5**	**7.5**	**8.5**	**1.8**	**2.0**
Centrally Planned	**29.0**	**32.2**	**36.6**	**1.6**	**7.6**
USSR	12.1	13.0	14.0	1.0	1.9
Eastern Europe	6.2	6.5	7.6	1.4	1.4
China	10.3	12.0	14.0	2.1	3.7
Other CP Asia	0.4	0.7	1.0	6.3	0.6
World Total	**116.9**	**138.0**	**157.0**	**2.0**	**40.1**

Source: WRA

Wood Based Panels

Consumption

The worldwide consumption of panel boards is expected to increase but at a slower rate than has been evident over the past 15 years (Figure 1-18). The regional projections are shown in Table 1-37 and the principal reasons for these are as follows:

- The effect of substitution for lumber will lessen since much of this has already taken place.
- The growth of new products such as MDF, OSB and other forms of reconstituted board will be very significant.
- North American demand will continue to grow but at a rate of less than 1 per cent per annum.
- Western European demand is expected to be strong, though well below the rapid growth that had occurred in the 1970s.
- Japanese demand has been somewhat stagnant due to the decline of the domestic plywood industry. The availability of economic supply from South-East Asia, together with substantial growth in reconstituted boards, should result in an increase in consumption.
- Increased domestic availability of panelboards in SE Asia will result in increased consumption.
- Considerable growth in consumption is expected in USSR and Eastern Europe. Per capita consumption in these areas is well below that of Western Europe.

Figure 1-18

Historical & Projected Worldwide Wood-Based Panel Consumption

(thousand m^3)

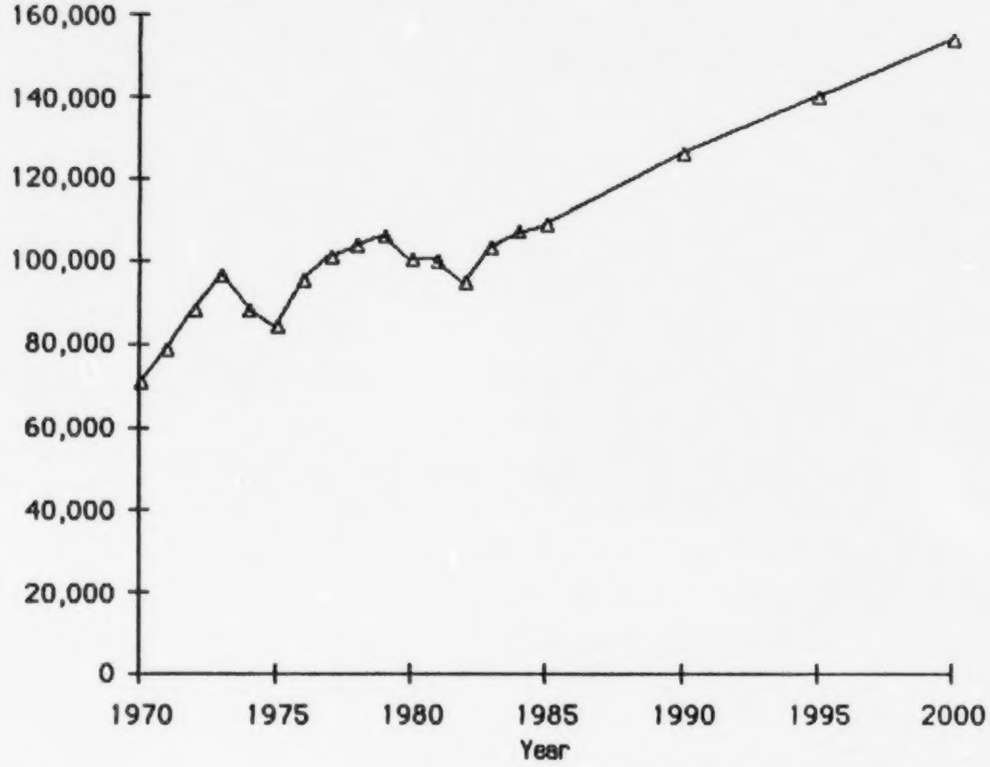


Table 1-37

World Consumption of Wood Based Panels

(million cubic metres)

	1985	1995	2000	Annual Growth (%/yr.)	Volume Change
North America	**37.6**	**41.0**	**42.0**	0.7	4.4
Canada	4.1	5.0	5.0	1.3	0.9
US	33.5	36.0	37.0	0.7	3.5
Western Europe	**26.6**	**33.0**	**37.0**	2.2	10.4
Scandinavia	2.4	3.0	4.0	3.5	1.6
Other	24.2	30.0	33.0	2.1	8.8
Latin America	**4.4**	**8.0**	**11.0**	6.3	6.6
Brazil	2.1	4.0	5.0	6.0	2.9
Chile	0.1	1.0	2.0	22.1	1.9
Other	2.2	3.0	4.0	4.1	1.8
Asia Pacific	**13.3**	**21.0**	**22.0**	3.4	8.7
Japan	7.6	11.0	12.0	3.0	4.4
Dev. Oceania	1.3	2.0	2.0	2.9	0.7
Others	4.4	8.0	8.0	4.1	3.6
Africa and Middle East	**4.3**	**5.0**	**6.0**	2.2	1.7
Centrally Planned	**22.4**	**32.0**	**36.0**	3.2	13.6
USSR	12.1	16.0	17.0	2.3	4.9
Eastern Europe	7.5	13.0	15.0	4.7	7.5
China	2.8	3.0	4.0	2.4	1.2
Other CP Asia	ns	ns	ns		
World Total	**108.6**	**140.0**	**154.0**	2.4	45.4

Source: FAO, WRA

ns not significant (less than 0.5)

Production

Much of the growth in production of panel boards is expected to occur in the developing and centrally planned economies. The dominance of the North American industry will decline so that, whereas in 1985 it represented about one-third of production, by the year 2000 this share will have dropped to one quarter.

Significant growth is judged likely to occur in Western Europe. Increased demand, together with new technologies that allow the use of low cost fibre, will result in production increases, though these will be less than demand growth. There will be an increasing trade deficit in wood based panels.

It is possible that there will be a substantial increase in the production of composite boards using wood fibre with cement or mine tailings as a bonding agent. The manufacturers' technologies for these products are improving and may be particularly attractive to some of the lesser developed economies where there is a great demand for low cost shelter.

The principal growth products will be reconstituted boards. In North America these boards are likely to be mainly structural i.e. waferboard/OSB whereas in other areas, such as Japan, non structural boards e.g. particleboard and MDF will predominate.

Table 1-38
World Production of Wood Based Panels
(million cubic metres)

	1985	1995	2000	Annual Growth (%/yr.)	Volume Change
North America	36.4	42.0	43.0	1.2	6.6
Canada	5.6	7.0	7.0	1.5	1.4
US	30.8	35.0	36.0	1.0	5.2
Western Europe	23.8	29.0	32.0	2.0	8.2
Scandinavia	3.4	5.0	6.0	3.9	2.6
Other	20.4	24.0	26.0	1.6	5.6
Latin America	4.7	8.0	11.0	5.8	6.3
Brazil	2.5	5.0	6.0	6.0	3.5
Chile	0.2	1.0	2.0	16.6	1.8
Other	2.0	2.0	3.0	2.7	1.0
Asia Pacific	17.9	24.0	27.0	2.8	9.1
Japan	7.1	7.0	8.0	0.8	0.9
Dev. Oceania	1.3	3.0	3.0	5.7	1.7
Others	9.5	14.0	16.0	3.5	6.5
Africa and Middle East	2.9	4.0	5.0	3.7	2.1
Centrally Planned	23.1	33.0	36.0	3.0	12.9
USSR	12.9	19.0	20.0	3.0	7.1
Eastern Europe	7.4	11.0	12.0	3.3	4.6
China	2.8	3.0	4.0	2.4	1.2
Other CP Asia	ns	ns	ns		ns
World Total	108.8	140.0	154.0	2.3	45.2

Source: FAO, WRA
ns not significant (less than 0.5)

Conclusions

- The great majority of panelboard consumption will be satisfied by production within the same region.

- The overwhelming dominance of the North American region, which currently accounts for close to one third of world wood product manufacture, will gradually decline over the next 15 years.

- Latin American production is expected to more than double by 2000 but this increase will be more than matched by increases in regional demand.

- Production in countries such as Indonesia and Malaysia will also increase substantially as more timber is processed locally. At the same time, consumption is expected to grow at a slower rate, therefore, export volumes are expected to increase.

- Though the net trade for the North American region remains relatively constant, it is expected that there will be some increase in shipments from Canada to the U.S and other markets as well as a decline in the net import requirements of the U.S.A.

- There is a substantial increase in the net deficit in Western Europe for each of the wood based panel products considered. It is not believed that the increased demand in the region can be satisfied by domestic production, even though significant increases are projected.

- A major factor that has caused the projected increases in demand in the industrial economies such as Western Europe is technological change. It has been assumed that product and consumer technology will change so that wood products can avoid continuing erosion from substitute products and even find new markets.

Table 1-39 provides regional self-sufficiency data for wood based panel products in 1985 and a projection to the year 2000. From this it can be seen that the Southeast Asian nations maintain their role as the world's principal source for panel product exports and that the non-Scandinavian countries of Western Europe will continue to be the major importers.

Table 1-39
Apparent Self Sufficiency in Wood Based Panels
(million cubic metres)

	Apparent Surplus or (Deficit) 1985	Apparent Surplus or (Deficit) 2000	Projected Change 1985-2000
North America	(1.2)	1.0	+2.2
Canada	1.5	2.0	+0.5
United States	(2.7)	(1.0)	+1.7
Western Europe	(2.8)	(5.0)	-2.2
Scandinavia	1.0	2.0	+1.0
Others	(3.8)	(7.0)	-3.2
Latin America	0.3	ns	-0.3
Brazil	0.4	1.0	+0.6
Chile	0.1	ns	-0.1
Others	(0.2)	(1.0)	-0.8
Asia-Pacific	4.6	5.0	+0.4
Japan	(0.5)	(4.0)	-3.5
Dev. Oceania	ns	1.0	+1.0
Others	5.1	8.0	+2.9
Africa and Middle East	(1.4)	(1.0)	+0.4
Centrally Planned	0.7	ns	-0.7
USSR	0.7	ns	-0.7
Eastern Europe	(0.1)	(3.0)	-2.9
China	ns	(1.0)	ns
Other CP Asia	ns	ns	ns

Source: FAO, WRA
ns not significant (less than 0.5)

2
SOME IMPORTANT CONSIDERATIONS

Industrial Roundwood Supply

Between 1970 and 1985, world production of industrial roundwood increased by 233 million m^3 (cubic metres) or 18 per cent. Although the equivalent average annual growth rate was a healthy 1.0 per cent, actual production/consumption fell well short of the 1.4 per cent per year average increase that had been projected in the exhaustive 1978 to 1981 world forest sector study conducted by an international industry working party under the aegis of the UNFAO.[1] During the 1970 to 1984 period, there were two major economic downturns with troughs occurring in 1975 and 1982 and the production/consumption of forest products are very sensitive to changes in economic activity (see Figure 2-1). Following the 1975 recession, production recovered to the working party's trend line forecast but, after the 1981-83 downturn it did not. This recession was much more severe and disruptive than had been anticipated and effects have been far reaching. The implications for future levels of demand for forest products, the product mix and prices were discussed in Section 1.3. Some of the more silent aspects of the fibre supply changes that occurred over the 1970 to 1984 period are given below. The data are shown in Table 2-1.

North America continued to dominate world production of industrial wood. This was true in terms of both the absolute level of production and the 1970 to 1985 incremental supply. Canada led the world in new softwood supply but, by virtue of a much larger hardwood harvest, China (including Taiwan) registered a greater overall increment. The United States recorded the third largest increment and in the remainder of the industrialized world, softwood production either declined (Japan and Scandinavia) or registered only modest volume gains (Other Western Europe and Developed Oceania).

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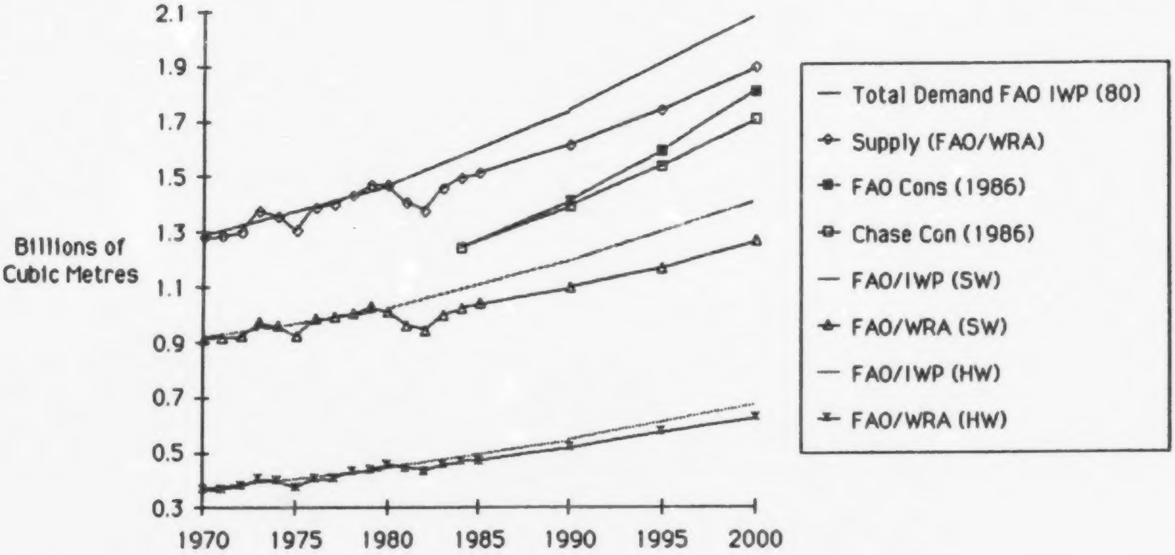
[1] World Forest Products, Demand and Supply 1990 and 2000 (UNFAO, Rome 1982) prepared by the Industry Working Party of the FAO Advisory Committee of Experts on Pulp and Paper.

Figure 2-1
World Total
Industrial Roundwood Production



The increment from the developing nations of Southeast Asia, namely Indonesia, Malaysia, and to a lesser extent, India, accounted for nearly 32 per cent of the world's new supply of hardwoods. Due to an early and rapid exploitation of the natural tropical hardwood forests, most of those gains had been registered by the mid 1970s (Indonesia and Malaysia) and the increment since that time has been relatively modest.

Table 2-1
Industrial Roundwood
Current Production and Historic Growth
(million cubic metres)

	1970 Production			1985 Production			1970-85 Increment			Apparent 1970-1985 Growth Rate		
	SW	HW	Total	SW	HW	Total	SW	HW	Total	SW	HW (%/year)	Total
North America	354	78	432	428	93	521	74	15	89	1.0	1.0	1.0
Canada	109	8	117	155	10	165	46	2	48	2.0	0.4	1.9
U.S.A.	245	70	315	273	83	356	28	13	41	0.5	1.1	0.6
Western Europe	155	53	208	165	54	219	10	1	11	0.3	0.3	0.3
Scandinavia	90	11	101	85	12	97	(5)	1	(4)	-0.6	0.5	-0.4
Others	65	42	107	80	42	122	15	ns	15	1.2	0.2	0.8
Latin America	22	27	49	42	53	95	20	26	46	5.5	5.6	5.5
Brazil	11	13	24	24	35	59	13	22	35	7.2	9.4	8.4
Chile	4	1	5	8	1	9	4	ns	4	7.2	-2.7	5.4
Others	7	13	20	10	17	27	3	4	7	1.4	1.7	1.6
Asia-Pacific	40	95	135	41	123	164	1	28	19	0.2	1.4	1.1
Japan	27	19	46	21	12	33	(6)	(7)	(13)	-1.7	-3.8	-2.5
Dev. Oceania	10	9	19	14	11	25	4	2	6	2.2	1.3	1.8
Others	3	67	70	6	100	106	3	33	36	3.7	2.3	2.4
Africa & Middle East	10	40	50	14	51	65	4	11	15	1.8	1.8	1.8
Centrally Planned	330	74	404	350	97	447	20	23	43	0.2	1.7	0.5
USSR	264	34	298	244	31	175	(20)	(3)	(23)	-0.8	-0.9	-0.8
E. Europe	39	21	60	47	27	74	8	6	14	1.5	1.5	1.5
China	26	16	42	58	35	93	32	19	51	5.6	5.2	5.5
Other C.P.Asia	1	3	4	1	4	5	ns	1	1	0.9	2.6	2.2
Total World	911	367	1,278	1,040	471	1,511	129	104	233	0.7	1.7	1.0
Per Cent	71	28	100	69	31	100	55	45	100			

( ) - negative

ns - not significant (less than 0.5 million m^3)

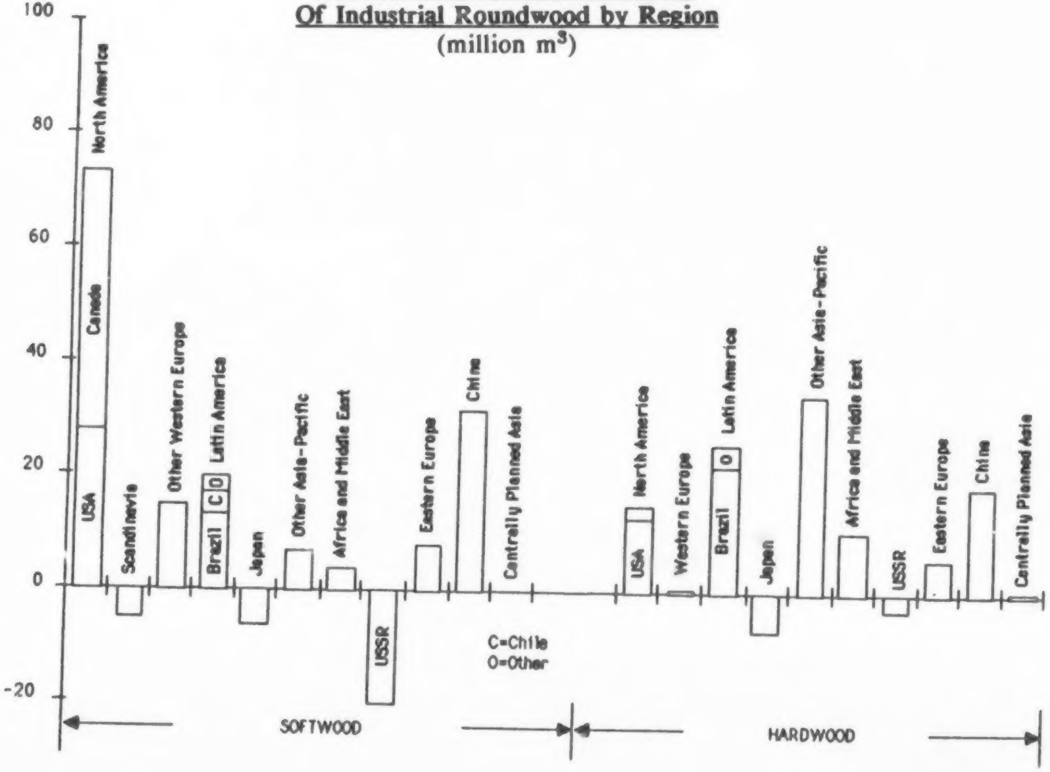
SW - softwood

HW - hardwood

Source: FAO, WRA

In the case of Latin America, new supply has been dominated by Brazil (hardwood and softwood) and Chile (softwood), and production continues to grow. By way of contrast, additional production from all of Africa and the Middle East (including Turkey) was less than 45 per cent of that which was recorded in Brazil alone (see Figure 2-2).

Figure 2-2
The 1970-85 Incremental Supply
Of Industrial Roundwood by Region
(million m^3)



In the centrally planned economies, declines in the USSR more than offset gains recorded in the Eastern European block. Although the FAO data for China may understate actual industrial roundwood production by about 50 per cent, the apparent 1970 to 1984 increment of 51 million m^3 is probably close to that which was achieved.[1] Despite this gain, China continues to suffer from a significant timber deficit and per capita consumption per unit of GDP is reported[2] to have declined by 50 per cent since 1970.

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[1] Ministry of Forests, Peoples Republic of China

[2] Op. Cit.

Despite static to declining domestic fibre supply, the forest industries of Japan (the world's largest importer of wood raw material) and Western Europe have continued to register significant gains in the real (constant dollar) value of forest sector production. The forest industries of these regions have become progressively more integrated and at the expense of commodity production, have concentrated on higher value added products to a much greater extent than their North American counterparts. This is particularly true with respect to the Canadian forest industries where past investments have tended to be fibre supply driven rather than motivated by market opportunity.

A review of published information from a variety of national and international sources indicates that by the year 2000 the supply of industrial roundwood from natural and plantation forests would likely be in the order of 1.9 billion m^3. On this basis 1985 to 2000 production increases would average 1.5 per cent per year as compared to 1.0 per cent per year during the 1970 to 1985 period. Demand scenarios prepared by Chase Econometrics and the FAO suggest industrial roundwood requirements in 2000 of 1.7 to 1.8 billion m^3 respectively.

However, the 1984 base period consumption estimate used by these two groups is 250 million m^3 (i.e. 16.6%) below WRA's best estimate of actual 1984 production. This missing volume is roughly comparable to what FAO classifies as "other industrial roundwood" and includes all non-firewood/fuelwood timber which has not been categorized as sawlogs, veneer logs or pulpwood. However, it is known that other industrial roundwood contains significant volumes of sawlogs etc. which have been misclassified by countries reporting to the FAO.[1] Consequently, to use only the volume recorded as sawlogs, veneer logs and pulpwood (as is done by Chase and the FAO) is to seriously underestimate the roundwood consumption of the sawnwood, panelboard and pulp industries.

The rate of change determined by the Chase scenario has been used as a guide in determining the slope of the Woodbridge Reed (WRA) projection of roundwood supply between the years 1985 and 2000. The 1980 FAO/Industry Working Party projection of timber demand has been included on Figure 2-1 as a further point of reference. This projection is considerably more optimistic than the WRA projection.

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[1] In the USSR for example, the ECE has estimated that about 65 million m^3 of logs classified as "other industrial wood" are actually sawlogs and veneer logs.

Table 2-2 and Figure 2-3 indicate that there will likely be some important shifts in industrial roundwood supply during the 1990s. In softwood, North America will no longer dominate the new supply scene as it has over the past 15 years. Chile, Developed Oceania (and in particular, New Zealand) and Japan will have very significant new softwood plantation resources coming on stream during the latter half of the 1990s. Over the next 10 years, about 20 million m^3 of new softwood supply should become available from Scandinavia and Other Western Europe with much of this volume being in the form of plantation thinnings (pulpwood). In the USSR, the region with the world's greatest reserves of natural forest softwoods, the downward trend in production which had been going on since 1975, was reversed in 1982 and expectations are for substantial gains over the remainder of the century. However, it has been projected that the USSR's 1975 production high will not be achieved much before 1995 and it is expected that most, if not all of the gain will be required for domestic consumption. Similarly, the entire increase projected for China plus a further 47 million m^3 (roundwood equivalent) of additional (over 1985) net imports could be needed to meet the minimum level of domestic demand.

Figure 2-3

The 1985-2000 Incremental Supply of Industrial Roundwood

(million m^3)

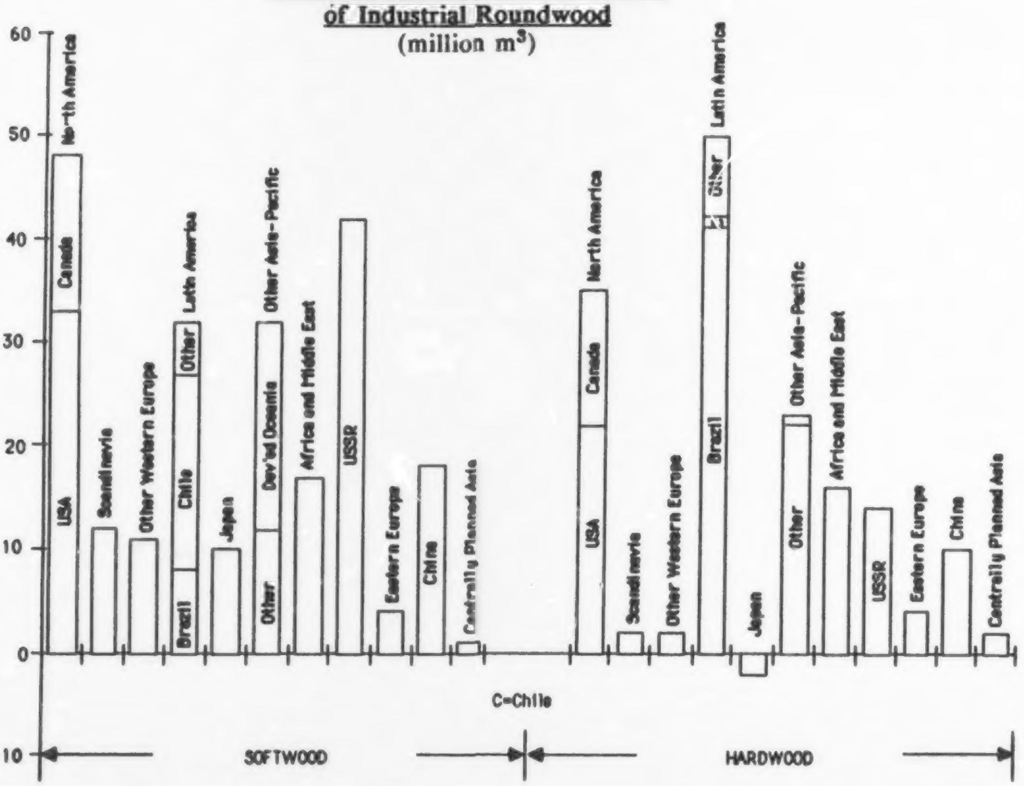

Table 2-2
Industrial Roundwood
Current Production and Projected Supply
(million cubic metres)

	1985			1995			2000			1985-2000 Increment			Apparent 1985-2000 Growth Rate		
	SW	HW	Total	SW	HW	Total	SW	HW	Total	SW	HW	Total	SW	HW (%/year)	Total
North America	428	93	521	460	114	574	476	128	604	48	35	83	0.7	2.2	1.0
Canada	155	10	165	162	16	180	170	23	193	15	13	28	0.6	5.7	1.1
U.S.A.	273	83	356	298	98	396	306	105	411	33	22	55	0.8	1.6	1.0
Western Europe	165	54	219	182	56	238	188	58	246	23	4	27	0.9	0.5	0.8
Scandinavia	85	12	97	94	13	107	97	14	111	12	2	14	0.9	1.0	0.9
Others	80	42	122	88	43	131	91	44	135	11	2	13	0.9	0.3	0.7
Latin America	42	53	95	55	88	143	74	103	177	32	50	82	3.8	4.5	4.2
Brazil	24	35	59	27	65	92	32	76	108	8	41	49	1.9	5.3	4.1
Chile	8	1	9	17	1	18	27	2	29	19	1	20	8.4	4.7	8.1
Others	10	17	27	11	22	33	15	25	40	5	8	13	2.7	2.6	2.7
Asia-Pacific	41	123	164	57	139	196	83	144	227	42	21	63	4.8	1.1	2.1
Japan	21	12	33	26	11	37	31	10	41	10	(2)	8	2.6	-1.2	1.5
Dev. Oceania	14	11	25	22	12	36	34	12	46	20	1	21	6.1	0.6	4.1
Others	6	100	106	9	116	125	18	122	140	12	22	34	7.6	1.3	1.9
Africa & Middle East	14	51	65	25	61	86	31	67	98	17	16	33	5.4	1.8	2.8
Centrally Planned	350	97	447	388	117	505	415	127	542	65	30	95	1.1	1.8	1.3
U.S.S.R.	244	31	275	271	41	312	286	45	331	42	14	56	1.1	2.5	1.2
Eastern Europe	47	27	74	49	29	78	51	31	82	4	4	8	0.5	0.9	0.7
China	58	35	93	66	42	108	76	45	121	18	10	28	1.8	1.7	1.8
Other C.P. Asia	1	4	5	2	5	7	2	6	8	1	2	3	4.7	2.7	3.2
World Total	1,040	471	1,511	1,167	575	1,742	1,267	627	1,894	227	156	383	1.3	1.9	1.5
Per Cent	69	31	100	67	33	100	67	33	100	59	41	100			

Source: WRA

The increasing importance of hardwoods (which can be seen from the 1970 to 1984 data) will continue over the remainder of the century. In the tropical regions most, if not all, of the hardwood supply increment will come from plantations as the reserves of natural tropical hardwood forests continue to dwindle. In Canada and the United States, natural hardwood stands have largely been either underutilized (e.g. aspen) or high graded for sawlogs and peeler logs leaving residual pulpwood stands. In the US South, vast areas of mixed pine/hardwood forests have been harvested for only the pine content and are now predominantly hardwood. It is currently estimated that nearly half of North America's remaining timber reserve is hardwood. The projected 1984 to 2000 North American roundwood supply increment reflects this reserve situation.

It has been estimated that about 70 per cent of the world's 1985 to 2000 softwood timber supply increment and 80 per cent of the hardwood increment will come from plantations. For softwoods, the leading producers of this supply of plantation wood will be the United States (South and Pacific Northwest), Chile, New Zealand, Japan, China, Brazil, and the Nordic countries. In plantation hardwoods, the principal supplier will be Brazil with lesser increments coming from China, Southeast Asia, Africa, and Iberia. The total potential supply of both softwood and hardwood plantation timber from developing countries is considerably higher than the volumes that have been included in Table 2-2 and Figure 2-3. Political instability, pressure from rural populations (e.g. firewood requirements and the need for agricultural land) and the fact that many plantations are remote from established infrastructure and are of uneconomic size has required discounting of projected yields.

THE OUTLOOK FOR FIBRE DEMAND

Paper Furnish Composition

The content of the paper furnish used to produce paper and paperboard has changed since 1970 as a result of two major factors:

- Paper makers are using an increased volume of recycled wastepaper.
- More filling and coating agents are being used in the furnish.

It is expected that the trend to the year 2000 will show an increased usage of both of these additives. More efficient recovery and usage systems for recycled waste papers are being developed in the industrialized countries and paper makers are continuing to experiment with filling and coating clays which give the paper surface improved printability.

Table 2-3 illustrates the components of the paper furnish composition from 1970 to 2000.

Table 2-3
Furnish Composition for Paper and Paperboard Production
(millions of tonnes)

					Avg. Annual Growth		
	1970	1985	1995	2000	1970-1985	1985-1995	1995 2000
Paper grade wood pulp	96.2	131.0	160.8	179.5	2.1	2.1	2.2
Wastepaper	24.0	51.1	76.3	87.5	5.2	4.1	2.8
Other fibre	5.8	10.5	12.4	13.6	4.0	1.7	1.9
Total fibre consumption	126.0	192.6	249.5	280.6	2.9	2.6	2.4
Filling & coating agent's consumption	5.0(E)	11.6	14.8	16.7	5.8	2.5	2.4
Total furnish consumption	131.0	204.2	264.3	297.3	2.9	2.6	2.4
Total paper and paperboard production	128.1	192.8	240.0	270.0	2.8	2.2	2.4

(E) - WRA estimate
Source: FAO

Secondary Fibre

The recovery and consumption of wastepaper has increased steadily since 1970 and the strong growth pattern is expected to continue. Approximately 30 per cent of the world's paper and paperboard consumption is recovered for re-use in paper furnish. This total is expected to grow to 39 per cent by the year 2000 as North American and Scandinavian paper makers attach more importance to re-used fibre. Table 2-4 illustrates the growth of wastepaper recovery and usage as a percentage of paper and paperboard production.

Table 2-4
Wastepaper Recovery and Usage
(millions of tonnes)

					Avg. Annual Growth		
	1970	1985	1995	2000	1970 1985	1985 1995	1995 2000
Total paper & paper board production	128.1	192.8	240.0	270.0	2.8	2.8	2.4
Paper grade wood pulp consumption	95.6	129.4	160.8	179.5	2.0	2.2	2.2
Per Cent wood pulp	74.6	67.1	67.0	66.5			
Wastepaper consumption	28.6	57.5	86.1	98.7	4.8	4.1	2.8
Less fibre loss on repulping	(4.6)	(6.5)	(9.8)	(11.2)			
Wastepaper Content							
- volume	24.0	51.0	76.3	87.5	5.2	4.1	2.8
- % of paper & paper-board production	18.7	26.5	31.8	32.4	2.4	1.8	0.4

Source: FAO

Recent increases in the usage of wastepaper have been most apparent in Asian countries which rely heavily on wastepaper due to their lack of domestic pulp production facilities. This trend is forecast to continue as these countries are expected to show the highest consumption increases of paper and paperboard products to the year 2000.

In addition, recycled wastepaper usage is expected to increase dramatically in North America where, until recently relatively small amounts of recycled waste were consumed. Major increases are forecast for recycled linerboard as new plants come on stream specifically to produce this product. For example, US consumption levels in 1986 increased by 8 per cent over the 1985 volume, partly as a result of two new greenfield recycled linerboard mills capable of producing over 425,000 tonnes per year. In Canada, 1986 consumption increased by 10 per cent over the 1985 volume.

While the major secondary fibre component now used is old corrugated containers, new, improved deinking processes are expected to result in further increases in recycled newsprint and coated magazine papers. In Western Europe, an increasing amount of recycled deinking grade is being used by the graphic paper sector and improved collection and sorting procedures are being developed to reduce contamination and spoilage.

Consumption of wastepaper in the EEC accounts for approximately 45 per cent of the industry's total furnish requirements.

In Japan, the usage of wastepaper has shown a steady increase; however, it is estimated that the usage is reaching its upper limits. This is also the case in some European countries.

Table 2-5 illustrates the 1985 wastepaper recovery and consumption for selected countries.

Table 2-5
1985 Wastepaper Recovery and Consumption
(thousands of tonnes)

Country/ Region	Recovered	Consumed	Imports	Exports	Utilization Rate (%)	Recovery Rate (%)
Canada	900	1,300	470	170	10	20
USA	16,200	13,200	70	2,700	23	26
Scandinavia	1,120	1,050	210	230	7	32
W. Europe	13,170	14,095	3,015	2,495	46	36
Latin America	1,715	2,310	645	0	28	20
Asia-Pacific	14,260	15,850	2,160	475	42	33
Africa & M. East	505	625	120	-	32	19
Centrally Planned	4,150	4,040	155	345	26	28
World total	**52,020**	**52,470**	**6,845**	**6,415**	**30**	**30**

Source: PPI

- = not significant

Industrial Roundwood

During the late 1970s as resource exploitation accelerated on the strength of soaring commodity values, it was widely proclaimed that serious timber shortages were imminent. The deep and protracted recession of the early 1980s saw a reversal of this thinking as commodity prices fell and logging equipment stood idle. Today, the prevailing view is that on a global basis, there is no shortage of fibre. Our analysis indicates that during the short term (i.e. up to 1990) this is indeed the case. Beyond that, consumption projections based on constant to declining real prices for paper, paperboards and commodity wood products (e.g. Chase Econometrics, the FAO) suggest that incremental fibre demand to the year 2000 might well be in excess of the incremental supply. The Chase and FAO projections show a need for an additional 460 to 565 million m^3 of industrial roundwood by the turn of the century. WRA's estimate of incremental roundwood demand to the year 2000 is 480 million m^3 as compared to a new supply of 380 million. The indicated deficit of 100 million m^3 is equivalent to about 5 per cent of the total supply of 1,894 million m^3 projected for 2000. As can be seen from Table 2-6 this projected shortfall is about 20 per cent for softwood and 80 per cent for hardwood timber.

Table 2-6
Estimated Incremental Worldwide Demand for Industrial Roundwood and the Apparent Supply/Demand Balance in 2000
(million cubic metres)

	Softwood	**Hardwood**	**Total Industrial Roundwood**
Incremental Demand for:			
Lumber products	133	83	216
Panelboards	9	54	63
Wood pulps	107	95	202
Total incremental demand	**249**	**232**	**481**
1985 supply & demand	1,040	471	1,511
Projected demand (2000)	**1,289**	**703**	**1,992**
Projected supply (2000)	1,267	627	1,894
Indicated deficit	**(22)**	**(76)**	**(98)**

Source: WRA

These indicated supply shortfalls are significant (i.e. 10 per cent of the softwood and 49 per cent of the projected hardwood supply increments respectively) but the total deficit is not particularly substantial (5% of total projected supply). The potential existence of a supply shortfall suggests that there could be some real price increases for forest products rather than the constant to declining prices assumed by the forecasting agencies. This in turn would have an impact on both the volume of final products demanded and the amount of fibre supplied. That is:

1) Rising real prices would constrain demand for fibre rich products and encourage substitution.

2) Real price increases would extend the economic margin and bring into use fibre resources which are now considered to be uneconomic.

3) The relatively large shortfall in hardwood supply should encourage the establishment of more plantations of fast growing hardwoods for the pulp/paper and reconstituted panelboard industries.

TERMS OF TRADE

This section is an overview of Canada's terms of trade. In this context, we use the expression terms of trade in the 'loose sense' of the trading conditions which must be met by Canadian producers of paper, pulp and wood products. We do not refer to the strict economics definition which relates to the ratio of export prices to import prices, and which is too narrow a definition for the purposes of this study. In this volume, and in subsequent volumes, for example, we discuss non-tariff barriers and other restrictions as well as stimulants to trade, such as export incentives.

Pulp and Paper Products

Newsprint and market pulp are international products in respect to both supply and demand, and while subject to the prevailing trading conditions in each region, they follow a general pattern of pricing and trading. The large volume of trade in 1985 for these two leading commodities is shown by the export tonnages from the major supply regions, namely, newsprint 12.4 million tonnes and market pulp 17.5 million tonnes.

The considerable trade in other grades of paper and board is mostly intra-regional. Intra-regional trade is subject to many different conditions and terms of trade, both on a direct basis between producers and end uses and also through the involvement of merchants and distributors. It is usually not possible for unilateral action to be taken by suppliers of the commodity grades, but as will be shown in the sub-section dealing with non-tariff barriers (NTB's) EEC Directorates have been successful in imposing restrictive terms of trade in connection with currency regulations for newsprint, market pulp, and linerboard.

Newsprint

Newsprint is sold worldwide to publishers on a delivered pressroom or warehouse basis, with the freight being prepaid by the seller.

Because of the nature of the industry, newsprint pricing is transparent in regard to "announced list" in all major market areas. Individual discounts are negotiated with publishers, and a range of price levels usually exists.

It is usual for payment to be made 30 days after delivery at the customers premises, with 60 days credit being customary in Japan. Extended terms are demanded and offered in periods of strong competition.

Other Grades of Paper and Board

Most of the other grades of paper and board are sold either directly to customers such as large printers, government purchasing agencies, boxboard and sack convertors, or to the paper and board merchant/distributors who are an integral part of the industry, especially in Europe, USA and Japan.

Merchants have a significant influence on trade in paper and board, adding an additional dimension to inventory control. They normally sell to the smaller end users, maintaining a wide range of products to satisfy individual requirements. Because of the large variety of paper and board which is required to meet local needs, they perform a service which cannot be given by the large producers who are often far distant from the final consumer.

Paper and board is shipped on a delivered basis, with a large range of terms being applicable according to individual negotiations. When paper and board markets are in periods of oversupply, the intensity of competition results in paper and board sellers offering discounts and extending credit terms, often beyond 90 days, in order to retain existing customers.

Trade is adversely affected, on the downside, by surges of new capacity which rapidly follows any period of balanced market conditions. It seems to be inevitable in the paper and board industry that this trend is repeated worldwide, in spite of experiences from previous cycles.

There has been a marked trend to larger machines which are highly productive, coupled with a concentration of the industry in fewer but bigger corporations. Both events have resulted in the demise of many smaller paper and board mills, which have traditionally served local market areas in Western Europe and Japan.

There will be more concentration and even larger and faster paper and board machines in the major supply regions. Smaller scale indigenous production facilities have been built in countries which are slowly increasing their paper and board consumption from very low levels, but as demand accelerates economical supply will have to be provided by world standard machines and technology.

Pulp

Market pulp is sold on a delivered mill basis in North America, and on a C&F basis (i.e. freight paid by seller, and also insurance in some cases) to most other market areas.

C&F terms for overseas shipments relate to the port of the buyer's choice, with onward inland freight costs being paid by each buyer. The prime competition for Canadian shipments in Europe is from the Scandinavians, who are often able to ship on a delivered mill basis via the available rail-sea links.

In some instances (e.g. China), buyers arrange freight with the supplier selling on an FAS basis (i.e. alongside vessel at port of loading). Providing that the volume to a single destination is large, this method is acceptable to pulp producers. But generally the concept is resisted because of the logistical difficulties which would result from having to service a multitude of vessels.

Until the late 1970s, pulp pricing was transparent with zonal "list prices" being announced quarterly. The international currency unit was the US dollar. The majority of buyers found these terms acceptable and appreciated a relatively uniform price for their prime papermaking raw material. Individual discounts, based on volume or other considerations such as fidelity or equity partnerships, are negotiated. These vary from market to market, and change rapidly according to the supply/demand balance.

Most market pulp is sold on a long-term contract basis, an arrangement which is mutually beneficial during periods of balanced supply. It gives assured shipments to the paper maker and allows the pulp producer to make reasonable production plans. But when pulp is in oversupply, such as in the early 1980s, contract arrangements break down. Pulp buyers, also faced with cost restraints, purchase on a short-term basis in order to take advantage of low-priced spot offers. During such periods, contracts often become "an obligation to the seller but an option to the buyer".

In some instances (e.g. South Korea, Turkey, China, and Comecon countries) market pulp is purchased by government agencies on a tender basis. Often, after the bids are examined, re-bids are called leading to downside pressure on pulp prices. Direct private buying is now prevalent in South Korea, although from time to time there are block purchases by OSROK (Office of Supply, Republic of Korea). In recent years, small purchases have been made by individual provinces in China.

Traditionally payment has been made 30 days after delivery, with some Japanese transactions being settled 10 days after shipment. But in pulp market downturns, terms are often extended to 60 to 90 days, with some as long as 120 to 150 days.

Letter of Credit terms are usual in sales to developing countries, and has been the accepted term of sale for the large volumes of pulp which move to China. This method of sale is time consuming and often requires exacting conditions and control, but is an imperative precaution for a prudent seller.

Because of increasing competition and the willingness of some supply sources to extend credit in order to gain business, it has become increasingly difficult to return to the 30-day concept during periods of "tight" supply.

General

In recent years there has been increased assistance by some governments to pulp suppliers in the form of various export incentives, lines of credit and credit insurance. This intensifies the competitive pressure on the traditional suppliers from countries with different economic policies and thrusts, limiting their ability to obtain favourable terms of sale.

The current balance in the market pulp cycle will lead to shorter credit terms, until the next downturn. As trade has expanded to the developing countries, credit risk has inevitably increased for pulp and paper exporters.

There is evidence that some pulp and paper supply sources receive active trade assistance from their overseas government agencies. Although this is alien to much of the entrepreneurial North American business culture, it is an established trade procedure in most parts of the world. This aspect is a feature which will be increasingly important in future years.

Wood Products

Wood products are generally sold on a spot or fairly short-term pricing basis. In developing countries this often involves letters of credit or bank guarantees but with the major trading partners such as Western Europe, the U.S.A., Canada and Japan a simple "cash against documents" approach is taken. In North America the level of commercial documents is at its simplest with little more than an invoice followed by a cheque.

There is a significant difference, however, between trade within North America and from North America to other regions in terms of timing. Orders for shipment in North America are often met within days or at the most two to three weeks. Both buyers and sellers are reluctant to commit further ahead. In contrast, much of the offshore business is committed several months in advance.

Credit is sometimes a factor in dealing with some areas but this is unusual for the bulk of the wood product business undertaken by North America.

From Canada, the majority of the offshore business is arranged on a delivered (C&F or CIF) basis but many US companies sell FOB dock or even FOB mill.

The currencies used vary significantly throughout the world even for the same product. US companies tend to sell everywhere in US dollars and the North American market price levels are tracked in US dollars. Similarly both the US and Canada sell to Japan in US dollars. Other supply sources, however, often sell in the currency of the purchasing country. Again, there are exceptions since Canadian shippers, while generally willing to sell in pounds sterling to the UK, sell in Canadian dollars to Continental Europe. The Swedish suppliers usually quote in local currencies to Continental Europe. The Swedish suppliers usually quote in Krona but the Russians, who sell on an annual contract schedule basis, establish prices in the importing country's currency and have a currency clause limited to the Swedish Krona. On the other hand, when the Russians sell to Japan, prices are in US dollars, as are prices from South East Asia to Japan.

As is evident from this brief analysis of some trade practices, there is no consistency of approach.

TARIFFS AND NON TARIFF BARRIERS

Pulp and Paper Products

With a few exceptions (especially in South America), market pulp and newsprint generally trade on a tariff-free basis internationally.

In contrast, the movement of paper and board faces a variety of tariffs, traditionally designed to protect indigenous industries. There has been a trend to ease and reduce paper and board tariffs following the Tokyo GATT round, between the major market areas. These were planned to be spread over a period of several years. Details of major tariffs are shown in the accompanying tables (2-7 to 2-9).

On the surface tariff reductions are continuing, but the recent wave of protectionist sentiment may pose an underlying threat, especially if paper and board are used as part of the overall bargaining structure. The trend towards increased free trade in paper and board may falter.

Table 2-7
Import Duties in Major Importing Regions
(%)

Product	Canada	U.S.A.	E.E.C.	Japan	Other
Newsprint	0	0	4.9[1]	3.1	5[2,3]
UCWC	0	0	9.0	4.6	
UWF	6.5	0	9.0	4.6	
CWC	2.5	2.5	9.0	3.8	
CWF	6.5	2.5	9.0	3.8	
Writing	6.5	2.4	9.0	4.6	
Liner	6.5	0	6.0	2.5-3.5	
Medium	4.0	4.0	9.0	9.6	
Kraft Paper					
Sack	0	0	8.0	7.0[4]	
Other	9.2	0	6.0	9.3[4]	
Bleached Board	6.5	0	6.0-8.0	10.0[5]	
Tissue	6.5	0	9.0	3.4	

Source: CPPA

[1] There is a quota for North American newsprint. If imports exceed the specified amounts, this tariff can be applied.

[2] Indonesia - recently introduced. Also NTB prohibiting imports.

[3] There are a wide range of tariffs in other markets, e.g. Turkey @ 25% US $150/tonne.

[4]&[5] Will be reduced in 1988 to 2.5-3.5%.

It should be noted that imports of Scandinavia, Austria and Switzerland into the EEC are now tariff free.

Table 2-8
Comparison of Import Duties in Major Importing Region Between Pre-Tokyo Round and 1987

(%)

Importing Country	Product	Pre-Tokyo Round	Effective Jan. 1984	Current Rates
Canada	Newsprint[1]	0	0	0
USA		0	0	0
EEC		7	5.7	4.9
Japan		5.5	4.1	3.1
Canada	Woodfree	12.5	8.8	6.5
USA	Uncoated	8c/lb.+2.0	2.5	
EEC		12.0	10.1	9.0
Japan		10.0	5.9	3.8
Canada	Mechanical	12.5	4.7	0
USA	Uncoated	8c/lb.+2.0	0	0
EEC		12.0	10.1	9.0
Japan		10.0	5.9	4.6
Canada	Kraft Paper	15.0	5.6	0
USA		4.0	1.5	0
EEC		8.0	7.0	8.0
Japan		15.0	9.3	7.0[2]
Canada	Liner	15.0	10.3	6.5
USA		3.0	1.1	0
EEC		8.0	7.0	6.0
Japan		15.0	9.3	2.5-3.5
Canada	Medium	15.0	8.1	4.0
USA		10.0	6.3	4.0
EEC		12.0	10.1	9.0
Japan		15.0	13.1	9.6

Source: CPPA

[1] There is a quota for North American newsprint. If imports exceed the specified amounts, this tariff can be applied.

[2] Will be reduced in 1988 to 2.5-3.5%.

It should be noted that imports from Scandinavia, Austria and Switzerland into the EEC are now tariff free.

Table 2-9
Some Import Duties in "Other" Importing Regions
(%)

Country	Chemical Pulp	News-print	Printing & Writing Papers	Kraft Paper	Liner
Argentina	24	29-38	38	38	38
Brazil	20	55	55	30-55	55
Chile	20	20	20	20	20
Colombia	10-20	0	35	35	35
Mexico	10	0	37	37	37
Peru	25	34	80	84	84
Venezuela	1-20	35	35	35	35
Austria	5	7	14	12	12
Switzerland	1-3	13	4.5	8.75	7-15
Egypt	0	0	5	20	20
Indonesia	0	5	30-40	30	30
Korea	5	25	25	25	25
S. Africa	0	0	10	15	10
Taiwan	10	20	35	40	40
Turkey	0	15	25	30	30

Source: CPPA

Subjectively there has always been a desire by the smaller producers to seek protection within their own market areas in the face of strong competition, both in price and technology, from larger and stronger neighbouring producers. This fact is very apparent in Europe, as the highly efficient Scandinavian and German production units take their toll of the smaller and less aggressive industries in the UK, France and Italy. In each of these countries, there are progressive firms who have faced up to the reality that tariffs alone will not ensure survival. They have improved performance to meet the demand of consumers who are not particularly interested in the source of their paper and board supply, only in the cost and product quality.

When the Canadian paper industry was polled prior to the current round of the Free Trade negotiations with the US, there was a divergence of opinion from different sectors in accordance with their individual situation. Some, such as tissue and some board producers, favoured protection. Others, such as most of the printing and writing group, preferred free trade in order to gain access to the vast US market potential.

In Europe, strong tariff barriers remain against North American paper and board, as shown in the tables. Recently the decline in the comparative exchange rate of the US/Cdn. dollar has offset the cost of the tariffs, but the structure remains. In contrast, over the past 20 years, the Scandinavian countries have manoeuvered their EFTA partnership with the EEC into a tariff free relationship for paper and board.

Japan has been reducing its tariff structures, but remains basically protectionist to its large domestic paper and board industry. For several years there have been statements of intent to lower tariffs for commodity grades so that Japanese producers can concentrate their limited fibre availability into higher value paper and utilize their superior papermaking technology. This drive has been slowed by the pragmatic need to sustain employment and delayed by the ability of the domestic industry to obtain continued high volumes of fibre either as baled pulp or in the form of chips to sustain record levels of domestic pulp production.

The strength of the Yen provides an ongoing incentive to continue this situation.

At this time, tariffs do serve as a cost deterrent and threaten expanding export sales to many regions of the world. Recent expansions of paper and board capacity in developing countries illustrate the ability of tariffs to promote domestic production. Those producers planning to increase their exports must take the cost of tariffs into account when evaluating the competitiveness of their own cost structures.

Although there has not been any action to date, opinions have been expressed in the US that action taken by the administration against Canadian softwood lumber could be extended to market pulp and newsprint because they "originate from the same (allegedly) subsidized wood resources". The supply and demand situation for these products differ from lumber, and implementation would not seem to be logical.

As recently as the end of April, the US Congress instigated legislation described as "an omnibus trade bill". Though it still has to be debated in both the House and the Senate before final approval, its tone is disturbing in an increasingly shrill environment of protectionist sentiment. The danger and concern is not only in regard to specific proposed legislation, but also with the prospect of trade restrictions being applied as short term answer to political problems or thrusts, rather than as long term strategies.

Non-Tariff Barriers

There are a range of non-tariff barriers (NTB's) which have or can be used to restrict the flow of paper and board imports in addition to specified tariffs. Even when tariffs have been reduced in accordance with GATT thrusts, import impediments can be found. These include the following:

- Quotas, or as in the case of newsprint to EEC, "plafonds" specify the volume which can enter duty free. Although sometimes ignored, the mechanism is in place to restrict or halt imports as required.

- Strict specifications can effectively eliminate imports on the grounds of actual or perceived quality differences. Detailed and stringent (thus expensive) inspection and documentation requirements are also an effective discouragement or barrier (e.g. Indonesia).

- Tender or bid requirements which are onerous or exceptionally costly to meet (e.g. bid or performance bonds for routine and low-priced products) are other forms of non-tariff barriers. Individual suppliers often find it difficult to comply with the necessary requirements. If desired, they can often be met with some government assistance.

- Legislation applied by the EEC regarding pulp imports (DG-4) effectively reduced the freedom of action between buyer and seller. Instituted to counter an alleged threat of pulp producers' price fixing, it became a bureaucratic imposition and trade irritant. The fact that implementation has been inconsistent, wavering with exchange rates does not alter the impediment.

- Alleged dumping of linerboard is a recurrent barrier to North American exports to Europe. An outright volume restriction affects Japan.

- Zonal preferential trade agreements now exist in South America (LAIA) and between Australia and New Zealand (ANZAC). The LAIA arrangements are most beneficial to intra-South American pulp and paper trading.

Wood Products

The tariffs on commodity lumber are relatively low or non-existent for the great bulk of the trade flows. Some exceptions are:

- Japan
    - S-P-F 8%
    - rough pine less than 160 mm 4.8%
    - spruce 7%
    - other species rough free
    - other species dressed free

- Australian tariff against scantlings (5%)

- EEC
    - dressed 4%
    - rough, less than 12.5 mm 3.8%
    - rough, greater than 12.5 mm free

- Argentina
    - rough, spruce 28%
    - other 34%

- Australia
    - cedar 2%, fir, hem, spruce - less than 450 mm
      - more than 450 mm
    - dressed softwood 15% less 64 cents per m^3
    - scantlings 5%

- China
    - rough 3-8%
    - dressed 9-14%

- Switzerland
    - rough 2.15 Swiss Francs per 100 kg.
    - dressed 9.37 Swiss Francs per 100 kg.

- Taiwan
    - rough free
    - dressed 20-25%

- Korea
    - rough 5%
    - dressed 20%

- Mexico
    - rough 10%
    - dressed 40%

For plywood and other panel products, however, some of the tariff barriers that exist are a real constraint to trade.

	Plywood	OSB (%)	MDF
EEC (other than quota)	10	10	10
US	20	4	4
Japan	15 to 10	12	12

In addition, of course, there is a temporary 35 per cent duty against shingles/shakes from Canada into the US. Furthermore, though not a tariff per se, the 15 per cent export duty on the sale of Canadian lumber to the US provides a substantial penalty to domestic exporters relative to US home market suppliers.

The tariff situation for products that do not fit into the standard categories of regular commodity lumber is extremely confused and each country has a variety of approaches. In the US alone there are the following examples:

- for doors the rate is 7.5 per cent;
- for door frames the rate is 5.1 per cent;
- furniture components are dutiable at 5 per cent but if the specification is a multiple of a component (e.g. has to be cut in half) it enters free;
- a spindle which could be a component for furniture bears a tariff rate of 4.5 per cent.

How the individual product is classified is often the result of a very subjective approach by the particular customs inspector. This in turn leads to further confusion.

As the Canadian industry moves towards the manufacture of more value-added products, the importance of these tariffs and how the product is identified will grow. A greater appreciation of the problems and the products will be essential at a government level.

Non Tariff Barriers

The obvious NTB's, such as the need for Japanese or German inspection of quality of selected products, are gradually being overcome. The whole area of NTB's, however, is very dynamic. New problems can arise quickly (e.g. the pine beetle scare in the EEC) or develop slowly due, for example, to a lack of understanding by code legislators when they are developing new regulations. They can also be encouraged deliberately by domestic or other competitors to create problems. They can take many forms, for example:

- deliberate bureaucratic delays on import;
- refusal to assign valid strength levels to Canadian species;
- unreasonable phytosanitary demands.

Though these NTB's are usually identified reasonably quickly through commercial channels, once they occur, it is essential that Canadian government trade offices in the markets keep a close watch on any possibly adverse developments.

TRANSPORTATION HISTORY AND FUTURE TRENDS

Pulp and Paper Products

The primary method of moving pulp worldwide is rail and marine transportation. In North America and Europe there is also some long distance movement by road. Generally bulk transportation of the largest possible unit volume is the most economical.

For Canadian producers, marine transportation is the link for over 3.1 million tonnes of market pulp and 1.3 million tonnes of newsprint. Quantities of linerboard and kraft paper are also shipped overseas.

Most other paper and board products are more often delivered by road, because production units are located close to the market and their delivery is usually concentrated on local distribution in smaller quantities.

Freight costs have a direct impact on the mill net returns of pulp and paper producers, because of the industry practice of quoting in delivered terms. Negotiating for and ensuring the lowest possible cost is a priority for Canadian pulp and paper producers who ship to a wide variety of markets. Many have to use combinations of transport methods to reach sales destinations.

Wood Pulp and Newsprint

Average transportation costs from the major supply sources to the major purchasing regions are shown in Tables 2-30 and 2-31 in order to indicate the degree of international competitiveness in regard to freight rates.

Table 2-30

Transportation Costs - Woodpulp

US$/ADMT

Origin	USA	NW Europe	Mediterranean	Japan
Western Canada				
Coastal Mill	88-100	45	50-55	42
Inland Mill	65-90	75	85-90	72
Eastern Canada	50-80	60	65	70
US				
South	40-60	40	50	60
West Coast	40-60	50	70	50
Scandinavia	70	20-30	40	60
Chile	50	45	50	45
Brazil	30	35	45	50

Table 2-31

Transportation Costs - Newsprint

US$/ADMT

Origin	Eastern USA	Western USA	Europe	Japan
Western Canada	-	45	65	70
Eastern Canada	60	70	60	80
Scandinavia	60	70	40-80	80
USA	55	70	50	75
New Zealand	-	95	90	50
Chile	55	50	60	80

Source: Comtrans

Notes

1. The rates of Tables 2-30 and 2-31 represent 1st quarter 1987 freight costs. They are averages and individual contracts will likely be lower.

2. Shipments in the US are from southern states.

3. Shipments within the US and from Canada to the US would have to be analyzed further to determine all of the ranges.

4. Scandinavian rates vary according to country of shipment and the various destinations in Europe.

5. In addition, inland freight from the port of discharge is paid by the seller.

Other Paper and Board Products

It would require detailed analysis to develop data showing freight rates for the wide variety of finished paper and board products. These rates are higher than for newsprint, not only because of enhanced value but also because of the storage factor, higher densities and the amount of care required to handle without damage.

The total freight cost for each producer will vary according to the individual distribution pattern. In general terms, freight represents 12 to 15 per cent of the selling price, increasing further when there is a downturn in prices.

The shipping and trucking industries are subject to regular market pressures. These have intensified in recent years because of overcapacity and deregulation respectively. In North America rail freight schedules have been more rigid because of the stronger control exerted by national transport commissions, but their deregulation is now creating a more flexible opportunity for shippers to negotiate improved rates.

Marine

Since 1980 the cost of marine freight has been decreasing. An example is the Canadian West Coast rate to N.W. Europe which has dropped from US $55/ADMT in 1980 to US $35/ADMT in 1987, a decline of 36 per cent.

Competition for marine business has been intensified because of the number of carriers seeking to obtain a share of the growing international pulp and paper business. During the recent recessionary period, when marine overcapacity was considerable, shipping companies offered contract freight rate concessions to retain business.

This was a welcome relief to pulp and paper producers who were experiencing an erosion of selling prices of up to $150/tonne, but the reductions cannot be assumed to be a permanent feature. It is known that carriers will be seeking an upward adjustment in rates as soon as possible because they consider those in effect to be uneconomical for their own operations. In fact, some increases are already under way and the trend is forecasted to continue into the 1990s.

Rail

In contrast, rail freight cost for surface traffic from Canada to the USA has doubled in the period 1975 to 1987. An index of pulp freight rates to the US from Canada shows the following trend:

1975	100.0
1980	180.4
1987	200.6

The recent move to deregulate the US railroads has already resulted in some freight reductions and the pending similar move in Canada will also offer an opportunity for renegotiations. The annual compounded rate of increase has fallen dramatically since deregulation moves came into place:

1975-80 = 12%
1980-87 = 2%

Deregulation of the North American truck industry has increased the number of vehicles available for pulp and paper traffic and has resulted in very competitive rates being available on many routes.

The long term trend for trucking still has to be determined, but at this time is providing shippers with competitive alternatives to rail. It is anticipated that the railroads will be unwilling to lose business and will react to the competition with improved and innovative services to reduce shippers costs.

Strategic Transportation Issues

Transportation expenses represent a significant portion of the selling price. Faced with relatively long hauls for most of its business, it is essential for the Canadian industry to continue to seek improvements in transportation productivity and efficiency. Competitive sources appear able to achieve equivalent costs, so that there is no general advantage for Canadian shippers in the international markets.

Carriers have established efficient bulk services to high volume markets such as Europe and Japan, but demand in these regions does have limits. It is important that other potential markets be identified by the industry and efforts made to ensure competitive freight services.

The development of competing freight services under new regulations is still uncertain. The question which must be answered is whether the changes will assist or hinder the ability of the Canadian industry to serve its many markets.

Traditional methods of shipment, both in terms of unit sizes (e.g. bale weights and roll sizes) and delivery methods (e.g. a) direct delivery by 50 tonne rail cars versus bulk movement to local central distribution warehouses and b) further development of marine movement for direct loading and use of containers) must be kept under constant review.

An example of innovation is the strategy of a Brazilian exporter who ships to the US. Initially deliveries were to a single port, but as the tonnage has increased substantially, bulk shipments are made to four strategic locations. Thus inland freight costs, charged to the shipper, are kept to a minimum.

In general, the pulp and paper industry has been well served by specialized transportation facilities, especially bulk carriers and improved handling and loading systems. It is imperative that all of the distribution chain from mill to customer cooperates to maintain high standards of delivered quality products. Efforts by producers to meet market requirements can be ruined by transit damage.

Wood Products

The significance of transportation, in a global context, is not great for wood products since only a small percentage of production is shipped from one region to another. To a country such as Canada, however, where the majority of production is shipped long distances to the consumer, the impact is much greater.

Due to the distribution patterns for Canadian wood products, over 80 per cent moves to the market by land, competing with other products also moving by land. In addition, a little under 10 per cent moves by water from the West Coast of Canada to the US South and East Coast. The balance is shipped offshore by water.

The use of road versus rail is closely related to distances with the shorter hauls usually being made by truck and as distances become greater, rail becomes more economic.

Transportation costs represent a high proportion of the delivered cost of the majority of wood products since much of these are relatively low value commodities. The proportion varies according to destination and source but some examples from Western Canada are:

to US South	25%
to Japan	20%
to North Europe	25%

Efficiencies in transportation are therefore essential if Canadian suppliers are to remain competitive against supply sources that are closer to the market. The volume of offshore movement to Europe and Japan has encouraged significant innovations. Special purpose vessels moving automobiles in one direction and large volumes of lumber on the return voyage are typical of these innovations. In addition, the growing use of "piggy back" internodal concepts in North America has served to keep costs down and provide customers with rapid delivery.

There is little doubt, however, that deregulation has created a very confused situation in the North American wood product business. The amount of money to be gained or lost in moving product to destination is substantial and most companies now have found that they need experienced transportation personnel to make sure the best routes are chosen based on individual negotiations with the freighting organizations-whether truck or rail.

Lumber

Table 2-32 details transportation costs within North America. Rates are shown from the producing areas of Western Canada, Pacific Northwest US, Eastern Canada and the Southern US to various market areas. Market areas selected are Midwest US, Eastern Seaboard, South Eastern US and Southern US.

Table 2-32
North American
Inland Freight Costs for Lumber
(US$ per thousand board feet)

Origin	Mid West	Eastern Seaboard	South Eastern	Southern
Western Canada	50-70	65-98	77-92	60-75
Pacific Northwest US	40-60	55-70	65-80	40-55
Eastern Canada	45-65	30-40	50-75	60-75
Southern US	20-30	25-40	15-30	10-30

Source: Comtrans

Notes:
1. Rates reflect the range of applicable rail or truck rates to various markets.
2. Kiln dried lumber with a weight of 1,700 lbs./mfbm has been assumed. Most green lumber is shipped by water.

Western Canadian lumber producers face the highest transportation costs in accessing the North American market. The vast majority of Western Canadian lumber moves by rail from producing mills directly to the customer or to a reload centre. Compared to all other producing regions, a large part of Western Canada does not have effective competitive access to trucks for movement to the market. Western Canada, particularly the coastal area, has the competitive factor of deep sea shipping to the Eastern US market.

Eastern Canadian producers have a much higher incidence of truck competition available to them. As well, the actual rail hauls are significantly less than Western Canadian producers. Some barge and deep sea movements to the US East Coast create transportation competition.

American producers in the Pacific Northwest and the South have significant truck and intermodal competition for their lumber. There are very few instances where the producer is captive to rail. The Pacific Northwest American producer does have one significant transportation disadvantage compared to the Western Canadian producer. The US Jones Act prohibits movements of cargo between two American ports in a foreign vessel. The result is that American lumber producers cannot economically move lumber by water from Seattle to the US East Coast.

Table 2-33
North American
Ocean Shipping Costs for Lumber
(US$ per thousand board feet)

	US East and Gulf Coast	California
Western Canada	40-52	35-50
Eastern Canada	20-30	no movement

Source: Comtrans

Notes:

1. Variations depend on shipment quantity.
2. California rates reflect barge and vessel rates.
3. Rates do not include inland freight charges or terminal charges at either end.

Overcapacity continues in the deep sea shipping market. Competition for cargo is very intense. The market is showing some signs of tightening, but excellent rates should prevail at least until mid-1988.

The following table details transportation costs from Western Canada, Eastern Canada, US South, Chile and Brazil to Northern Europe and the Mediterranean.

Table 2-34
Lumber Transportation Costs to North Europe and the Mediterranean
(US$ per thousand board feet)

Origin	North Europe	Mediterranean
Eastern Canada	60-90	75-85
Western Canada	55-85	60-90
US South	65-90	70-80
Chile	47-94	59-118
Brazil	71-118	71-118

Source: Comtrans

Notes:

1. All rates have been converted to mfbm
2. Ranges reflect parcel sizes available
3. Most large movements would occur at the low end of the scale
4. US South and Eastern Canadian rates indicate container rates are less than break bulk

The shipping market is still very depressed. Overcapacity means that owners are vigorously competing for cargos. Canadian shippers are well positioned competitively to both North Europe and the Mediterranean. Low end numbers for Chile are rather surprising.

Table 2-35 details transportation costs to Japan from West Coast Canada, New Zealand and Chile.

Table 2-35
Lumber Transportation Cost to Japan
(US $ per thousand board feet)

Origin	
Western Canada	45-75
New Zealand	60-85
Chile	45-94

Source: Comtrans

Notes:

1. Variations depend on shipment quantity
2. All rates have been converted to US $/mfbm
3. Rates do not include inland transportation costs or terminal charges

Panel Products

Some representative rates for the movement of panel products within North America are given in Table 2-36. These rates reflect the range of specific rates which are applicable from the points of manufacture to the market and are based on rail and truck movement. Railroads tend to be used for the high volume, long distance movements but the trend is to increased use of trucking, even for some long distance hauls.

Table 2-36
North America
Inland Freight Costs for Panelboards
(US$ per tonne)

	Western Canada	Eastern Canada	US Mid West	US South	US East
Western Canada	10-65	55-75	60-70	85-95	85-95
Central Canada	35-75	35-60	40-60	na	75-90
Eastern Canada	50-65	10-35	40-70	na	50-70
Southern US	na	na	50-60	15-30	45-60
Western US	10-45	na	40-60	na	na

Source: Comtrans

na not appropriate

EXCHANGE RATES

Forest products are internationally traded commodities and most are priced on this basis. While regional price differences can be attributed to factors such as: transportation and manufacturing costs, inventory variations and fluctuations of supply and demand; relative exchange rates are also a very important factor affecting demand and pricing, especially in today's volatile markets.

Market pulp has generally been priced worldwide in US dollars. This is also the case for newsprint, some other commodity paper grades and certain wood products. Hence, an appreciation in the value of the US dollar increases the price of market pulp in local currency terms to those buyers with weakened domestic currencies. On the supply side, however, a weak currency gives producers a competitive advantage - any cost increases passed on in the price of pulp are softened by the buyer's favourable exchange rate. For example, in addition to its low cost wood resources, Brazil's much devalued currency has helped to establish the country as a low cost producer relative to its Norscan competitors.

Since the Bretton Woods exchange system of an 'adjustable peg' was dismantled in 1971, all member countries of the IMF[1] have adopted widely differing exchange regimes. This has led to a more flexible and volatile currency market, with an enormous impact on trade in forest products. As more suppliers have entered the forest products industry, the currency factor has become an increasingly important determinant of producers' competitiveness. Therefore it is important to look at both historical and predicted exchange rate behaviour and the implications this has for pulp and paper pricing. This analysis will be carried out in terms of the US dollar.

Currency Histories 1970-1986

Since 1973, several exchange systems have evolved, most of which are 'managed' flexible exchange rates. The major currency countries like the US, Japan, the UK and Germany have allowed their exchange rates to 'float', while most smaller countries have pegged their currencies to a major currency, such as the US dollar, or to some 'currency basket' such as the IMF Special Drawing Right, to ensure stability.

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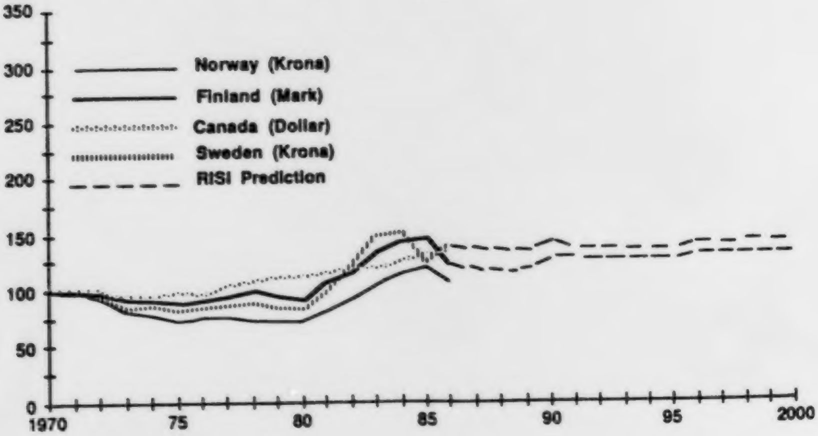
[1] IMF - International Monetary Fund

Figures 2-4 to 2-6 show relative currency values in terms of the US dollar for the primary world pulp and paper trading partners. (Listings of several countries' exchange rates for 1970 to 1986 are provided in Appendix A.)

Canada's dollar fluctuated within a close band of the US dollar until 1977, but then depreciated steadily until 1986. From 1970 to 1986, the annual percentage increase in the C$/US$ ratio was 2.2 per cent.

Figure 2-4 shows that the Scandinavian currencies all strengthened against the US dollar until 1976, and then generally declined over the next ten years. From 1970 to 1986, Sweden's currency weakened the most, on average 3 per cent per annum, and this country's currency devaluations (for example, a 16 per cent devaluation against the US. dollar in October 1982) had, until 1985, made it the most competitive Norscan producer. This trend has reversed itself from early 1985 to the current time due to the significant strengthening of European currencies vis-a-vis the US dollar.

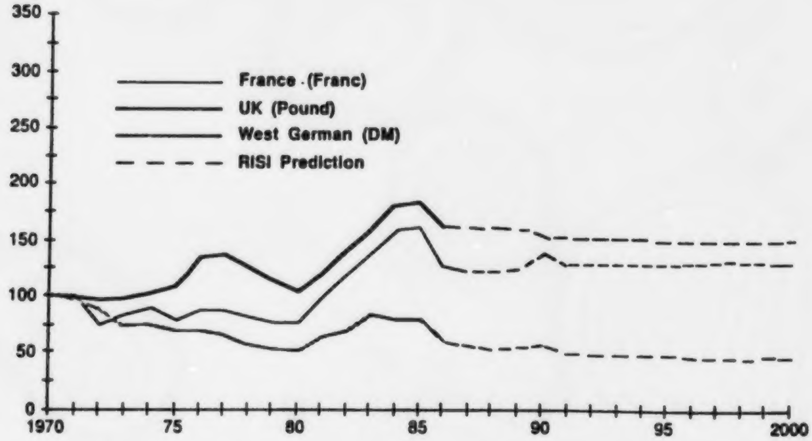
Figure 2-4
Relative Value of US Dollar vs
Canadian Dollar & Scandinavian Currencies
1970 = 100



Note: Increase Denotes Strengthening of the U.S. Dollar

Figure 2-5 illustrates the currency trends of three representative West European countries, all of which are significant pulp purchasers. From 1980 to 1985, the French Franc and British Pound Sterling depreciated steadily against the US dollar. This trend has reversed, starting in April, 1988 and continuing to the present. Over the long run, the West German Deutschemark (DM) has strengthened against the US dollar, albeit with some weakening over 1980 to 1985. As a result of West Germany's strong external export position, the DM has been very strong recently, valued at .55 in June 1987 compared to .34 in 1985 (in terms of US dollars).

Figure 2-5
Relative Value of US Dollar vs
Major European Currencies
1970 = 100

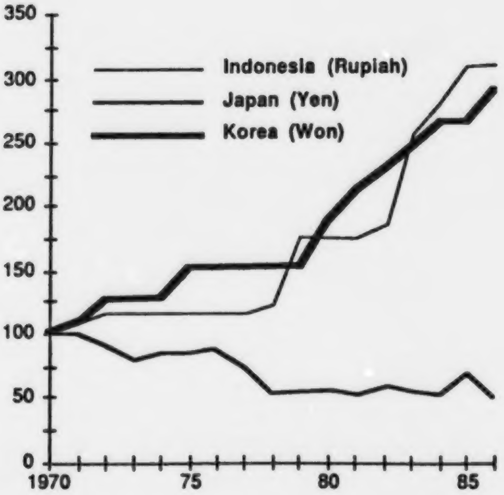


Note: Increase Denotes Strengthening of the U.S. Dollar

From 1970 to 1986, the Japanese Yen appreciated at an average of 4.3 per cent per year against the US dollar. This has important implications for the market pulp and newsprint trade. As its currency strengthens, Japan's paper producers tend to substitute low priced (in terms of Yen) imported pulp for domestically produced pulp. The strong Yen, and Japan's desire to reduce its large trade surplus, resulted in a substantial increase in net Japanese pulp imports in 1986. This pattern is expected to continue given the forecasts for a strong Yen versus the US dollar until the year 2000.

Most of the other Asian currencies have depreciated against the US dollar since 1970. Many of the Asian countries kept their exchange rates based on the US dollar over this time period and as a result of the steady rise in the value of the dollar, repeatedly devalued their currencies. This is evident for the Korean Won and Indonesian Rupiah in Figure 2-6.

Figure 2-6
Relative Value of US Dollar vs
Major Asian Currencies
1970 = 100



Note: Increase Denotes Strengthening of the U.S. Dollar

Only the Chinese Renminbi (Rmb) has shown a different pattern over 1970 to 1986. It appreciated against the US dollar until 1980 and has weakened since. Recently, the currencies of Taiwan and South Korea have started appreciating against the US dollar, as a result of their trade surpluses.

The currencies of New Zealand and Australia both appreciated against the US dollar until 1974 and have generally weakened since, although New Zealand has rallied somewhat since 1986.

All Latin American currencies have depreciated significantly in terms of the US dollar since 1970 and this has accelerated in recent years with their high inflation rates. Until very recently, Brazil appeared to have succeeded in slowing inflation and stabilizing its exchange rates with the Cruzado plan and price freeze. But inflation has begun to accelerate again, further depreciating Brazil's currency.

Figure 2-4 to 2-6 all show that the US dollar maintained a strong position against most currencies from 1980 to 1985. Given the growing US external deficit, the US dollar was considered to be overvalued for several years and its current depreciation was anticipated by many analysts. Although the US dollar and Canadian dollar both peaked vis-a-vis the European currencies in March/April 1985, they have weakened considerably since that time. Between February 1985 and January 1987, the US dollar fell 34 per cent in trade-weighted terms versus the W. German DM, and 42 per cent against the Japanese Yen.

Exchange Rates and Pricing

For internationally traded products such as pulp and paper, exchange rates have become a major factor in determining competitiveness. Exporting countries are helped in increasing their market shares when their domestic currencies depreciate. This is demonstrated by the recent weakening of the US and Canadian dollars vis-a-vis the world's other leading currencies. This has effectively reduced the price of forest products produced in North America in terms of the purchaser's domestic currency (W. Europe and Japan).

Pulp pricing in Western Europe illustrates the importance of exchange rates on pricing. In late 1981, the EEC's Directorate General for Competition (DG4) addressed a "statement of objections" to Europe's pulp suppliers. It stated that due to the fact that all pulp trade was conducted in US dollar prices, it enabled sellers to fix pulp prices, which hurt European paper makers. The situation worsened as the value of the US dollar climbed and finally the commission ruled that the pulp suppliers in question were to "quote, sell, and invoice at least 50 per cent of the total volume of bleached wood pulp ... in the currency of the buyer...". This regulation went into effect on March 31, 1985.

In October 1982 the Swedish Krona was devalued by 16 per cent against the US dollar. This happened at a time when the US dollar was strengthening steadily against the European and Asian currencies, and it enabled the Swedes to secure a larger share of the European pulp market. A ten week labour shutdown in British Columbia in 1984 drove up the price of North American pulp, which further enhanced the Swedish position and put price pressures on the higher-cost North American producers. There was considerable market confusion and prices finally collapsed in the second half of 1984.

Paradoxically, the DG4 regulation not only hurt the paper makers it was supposed to protect, but it helped to eliminate the Scandinavian cost advantage. Starting in April 1985, the US dollar and Canadian dollar have declined steadily against the European currencies, including those of the Scandinavians. North American pulp suppliers are gaining on exchange premiums from sales in European currencies, while the Scans are now under price pressures because of their relatively strong currencies and higher inflation rates. It has been demonstrated that profit margins for pulp mills in both Canada and Sweden converged by the end of 1985.

Implications for Cost Competitiveness

As more pulp suppliers enter the international pulp market, cost competitiveness increasingly becomes a major determinant of market share. Factors such as fibre and input availability, productivity and transportation costs determine the real cost of pulp, but the relative strength of the pulp buyer's currency imposes a "ceiling" on how much of these costs can be passed on in the price of the product. Thus, a pulp producer who has a weak currency relative to the US dollar can, up to a point, pass on increased costs to buyers with strong currencies without losing market share.

Pulp costs have a direct impact on paper makers' margins. How much of a cost increase is passed on to the buyer is determined by relative currency strengths and the price elasticity of demand for the product. Pulp demand is becoming more flexible as technological developments enable paper makers to utilize more low cost pulp.

The situation which now exists between major pulp and newsprint traders, like Canada and Sweden, is a good illustration of the role of exchange rates in determining cost competitiveness. The Canadian dollar dropped 13 per cent annually against the SEK from 1977 to 1979, and this secured healthy margins for Canadian pulp exporters. The tables turned during the period from 1979 to 1984, when the SEK dropped 43 per cent against the Canadian dollar; Sweden gained a competitive advantage as the low-cost producer during this time, and increased its market share.

From 1984 to 1986 the SEK appreciated 17 per cent against the Canadian dollar, which implies a new shift in relative competitiveness in favour of Canada. Furthermore, when measuring with GDP deflators, Sweden has experienced higher inflation rates than Canada during this time: Canadian inflation increased 5 per cent over 1984 to 1986, while Sweden's price level rose by approximately 11 per cent. Thus, nominal costs at the mill level have increased faster in Sweden, at a time when its currency has been strengthening. This has also helped to erode Swedish mill profit margins. The result is that currently Canada is the lower cost producer of market pulp and newsprint (excluding the relatively small volumes of Latin American production).

In recent years, non-traditional pulp producers such as Brazil and Chile have entered the world pulp markets. With their relatively low currency values, they are clearly the new low-cost competitors. This could imply more downward pressure on world prices in years to come during periods of market demand weakness.

Future Scenario and Currency Trends

Figures 2-4 to 2-6 chart several historical exchange rates relative to the US dollar, as well as projections for the UK Pound, French Franc, German DM, Swedish Krona and Finnish Mark to the year 2000.

There is general agreement among foreign exchange experts that the Canadian dollar will continue its current rally against its US counterpart. Some believe that this will continue for another two years - perhaps settling at around US$0.80. This prediction is based on the perception that Canadian assets are relatively inexpensive, and that higher interest rates have made the Canadian dollar stable against the US dollar, inducing strong capital inflows.

However, despite the current large US trade deficit and the weakening of the US dollar since 1985, Canada's monetary and fiscal policies will probably continue to follow those of the US to a major degree. Taking this into consideration, as well as the Canadian dollar's constant decline versus the US over the past 10 years, it seems unlikely that the Canadian dollar will attain a value of US$0.80, although it will show some strengthening. However, the Canadian dollar has weakened considerably against the world's leading currencies (excluding the US$). From its 1985 peak, it declined over 38 per cent by February 1987. Thus while Canada's currency has rallied against that of the US, both have declined against buyers' currencies. This has effectively reduced the cost of pulp produced in Canada on a US dollar basis, and contributes to Canada's competitive advantage in the West European and Japanese markets. Given the US trade deficit, this depreciation of the US currency may continue for awhile, with the Canadian dollar in tandem. However, experts agree that the current value of US dollar is consistent with the nation's deficit, therefore it is unlikely to decline further.

As mentioned previously, all Asian currencies except those of Japan, Taiwan and Korea have weakened against the US dollar. While rapid growth of real income and a surge in demand for pulp and paper are predicted in Asia, these factors may be offset by a further weakening of Asian currencies. This is entirely dependent on the price elasticity for pulp and paper in these countries, and whether or not devaluation continues at its current rate. RISI optimistically projects that in the long run the other Asian countries will rival Japan as pulp importers. Although it is currently an erratic market, China is also perceived as a large and promising future market for Canadian pulp and paper products. However, Canada will face stiff competition from New Zealand and Australia. Their currencies have depreciated against the US dollar over the 1970 to 1986 period, making them low-cost competitors of Canada and they are predicted to become major net exporters of pulp and paper by 2000.

While most Latin American countries play a small part in the world pulp and paper trade, Brazil promises to be a major contender in the world market over the next 15 years despite its current debt problems. With its low fibre and labour costs and exceedingly low exchange rate, Brazil could attain a very competitive position in the pulp market, especially in hardwood kraft. Like Brazil, other Latin American countries (e.g. Chile, Argentina, Venezuela) may expand market pulp capacity over the next fifteen years, and RISI predicts the entire region will become a net exporter of chemical paper grade pulp by the year 2000. Hence Latin America also presents a challenge to Canadian producers in the growing Asian market, especially if key country currencies continue to devalue.

Summary

Currency fluctuations will continue to be an important factor in market pulp pricing. There is general consensus that the US dollar will remain within close range of its current relationship with major European and Japanese currencies because this is consistent with the present US current account deficit. There may even be a possibility of further long run US dollar depreciation if the deficit persists. In either case, pulp prices should remain relatively low in terms of Japanese and European currencies. It should be noted, however, that these exchange rate forecasts are made under the assumption of slow increases in energy costs and no major supply or demand shocks.

Finally, Canada's ability to compete in the Asian market rests on whether or not the latter's currencies continue to depreciate relative to the US dollar, rendering North American products too expensive to import.

EMERGING MARKETS

Paper, Paperboard and Paper Grade Pulp

Introduction

Review of pulp, paper and board demand in North America, Europe and Japan shows a consumption pattern which was relatively well established by the beginning of the century and has continued to grow at a vigorous pace since the end of WW II.

In these regions, less than 1 billion people have an annual per capita consumption of paper and board which range, with few exceptions, from 90 to 280 kg/year. They consume 75 per cent of the world's annual output. Although annual consumption varies within each country, few inhabitants are unacquainted with paper and board products, and for many, consumption is beyond the stated "averages". Advertising, business papers, communication and packaging all have a major role in the economic structure of the developed countries.

The situation in the Asian Pacific rim, which embraces almost two thirds of the world's population, is completely different. There are two major exceptions, Japan and Australia /New Zealand where both production and consumption of pulp and paper are at European standards. These countries are not covered in this section because they are major participants in both production and consumption of pulp and paper.

This section will cover the countries in which the paper industry generally has a small role. The cause is either a lack of resources or because, with two major exceptions (Taiwan and South Korea), the national economic policy either is ineffective in, or has decided against, achieving vigorous development of an indigenous industry.

Collection and interpretation of statistics for most of the countries is not easy. In many cases data were non-existent until the 1970s. Although there has been marked improvements in the past few years, the lack of coordinated national associations and product identification makes analysis less certain than it is elsewhere.

As shown in the overview Tables 2-37, 2-38 and 2-39 there has been increasing activity in South East Asia. The emerging demand for market pulp, commodity and specialty paper and board, and also technical assistance to upgrade the industries, is limited only by economic performance. It presents a marketing and sales opportunity for producers of these products from developed countries.

However, growth in demand will vary, and will depend primarily on the ability of countries in this region to experience higher GDP growth. Existing debt and priority of expenditure on basic requirements such as energy and transportation may inhibit growth in per capita consumption of paper products.

Paper is a basic necessity for communication, education and business activity, and board is a relatively low cost packaging medium for exports and domestic distribution. Based on the populations involved, adoption of products at even relatively low per capita consumption rates will result in significant demand for paper and pulp. The pace will be slow and exporters will have to become accustomed to the different needs and programs which each country and regime is pursuing.

Table 2-37
Southeast Asia and the Pacific Rim
Norscan Chemical Paper Grade Market Pulp Deliveries

(thousands of tonnes)

Country	Total				Canada				U.S.A.				Scandinavia			
	1983	1984	1985	1986	1983	1984	1985	1986	1983	1984	1985	1986	1983	1984	1985	1986
Bangl h	15	17	15	18	2	7	8	4	2	0	0	2	11	10	7	12
Chin	598	333	353	298	333	195	257	189	51	29	29	34	214	109	67	75
Hong	8	11	12	15	1	0	1	3	7	11	11	12	0	0	0	0
Korea	268	281	401	448	71	69	123	140	166	177	238	297	31	35	40	11
Taiwan	111	99	179	180	41	38	75	68	36	38	79	96	34	24	25	16
Phil	24	21	24	16	12	10	17	12	4	9	4	3	8	2	3	1
Indonesia	194	132	136	171	47	49	32	54	77	46	71	96	70	37	33	21
Malaya/ Singapore	8	11	16	20	2	5	10	12	4	4	4	5	2	3	2	3
Thailand	71	49	55	48	12	18	27	29	5	6	17	9	54	24	11	10
India	25	55	129	129	4	16	54	51	1	3	38	26	20	36	37	52
Pakistan	13	16	32	129	7	6	14	2	0	0	9	3	6	10	9	14
Sri Lanka	4	9	3	7	0	6	1	7	0	0	0	0	4	3	2	0
Other Asia	18	14	8	7	0	0	7	2	1	0	0	0	17	14	1	5
Total Asia	1,358	1,046	1,361	1,376	533	418	627	573	354	322	498	583	471	306	237	220
Japan	1,207	1,240	1,354	1,618	673	671	730	859	428	467	515	681	106	102	109	78
Australia	119	116	106	166	70	66	71	81	12	19	11	22	37	31	24	50

Table 2-38
Southeast Asia and the Pacific Rim
Production - Net Imports - Apparent Consumption of Paper and Board

(millions of tonnes)

Country	Production of Paper and Board				Apparent Consumption of Paper and Board				Net Imports of Paper and Board			
	1982	1983	1984	1985	1982	1983	1984	1985	1982	1983	1984	1985
Bangladesh	73	90	106	115	83	85	104	110	10	-5	-2	-11
India	1,250	1,337	1,367	1,590	1,520	1,520	1,574	1,740	270	183	207	150
Pakistan	120	133	105	109	225	260	248	315	105	127	143	206
Sri Lanka	25	25	25	25 est	65	72	70	70	40	47	45	45
P.R. China	5,890	6,613	7,560	8,167	6,222	6,931	8,010	8,748	332	318	450	581
hong Kong	20	20	35	40	620	620	790	840	600	600	755	800
Rep. of China	1,740	1,980	2,207	2,311	1,670	1,940	2,194	2,290	-70	-40	-13	-21
Indonesia	330	380	405	480	630	630	649	700	300	250	244	220
Philippines	233	287	252	218	366	427	399	394	133	140	147	176
Malaysia/Singapore	65	75	95	110	570	580	675	672	505	505	580	572
Taiwan	1,557	1,720	1,929	2,018	1,487	1,704	1,982	2,063	-70	-16	53	45
Thailand	351	360	329	350	491	517	490	505	140	157	161	155
Other	1,054	1,020	963	978	2,189	2,127	1,892	1,925	1,135	1,107	929	947
Total	12,708	14,040	15,378	16,501	16,138	17,413	19,077	20,366	3,430	3,373	3,699	3,865
Japan	17,500	18,300	19,300	20,500	17,300	18,100	19,200	20,700	-1	-3	-1	2
Australiasia	2,500	2,400	2,300	2,400	300	2,700	2,700	3,000	5	3	4	6

Source: WRA database, PPI Annual Review, National Pulp and Paper Associations

Table 2-39
Southeast Asia and the Pacific Rim
Paper and Board
Apparent Consumption
1 kg/Capita

Country	1986	Population (millions)
Bangladesh	1.1	100,000
India	2.5	700,000
Pakistan	3.6	88,000
Sri Lanka	4.7	15,000
PR China	9.3	1,046,400
Hong Kong	161.5	5,200
Rep. of Korea	55.6	41,200
Indonesia	4.7	150,000
Philippines	7.2	55,000
Malaysia/Singapore	47.9	14,000
Taiwan	107.2	19,250
Thailand	10.1	50,000
Other	8.8	220,000
Total	**8.5**	**2,504,050**
Japan	171.1	121,000
Australasia	129.3	23,200

Source: PPI

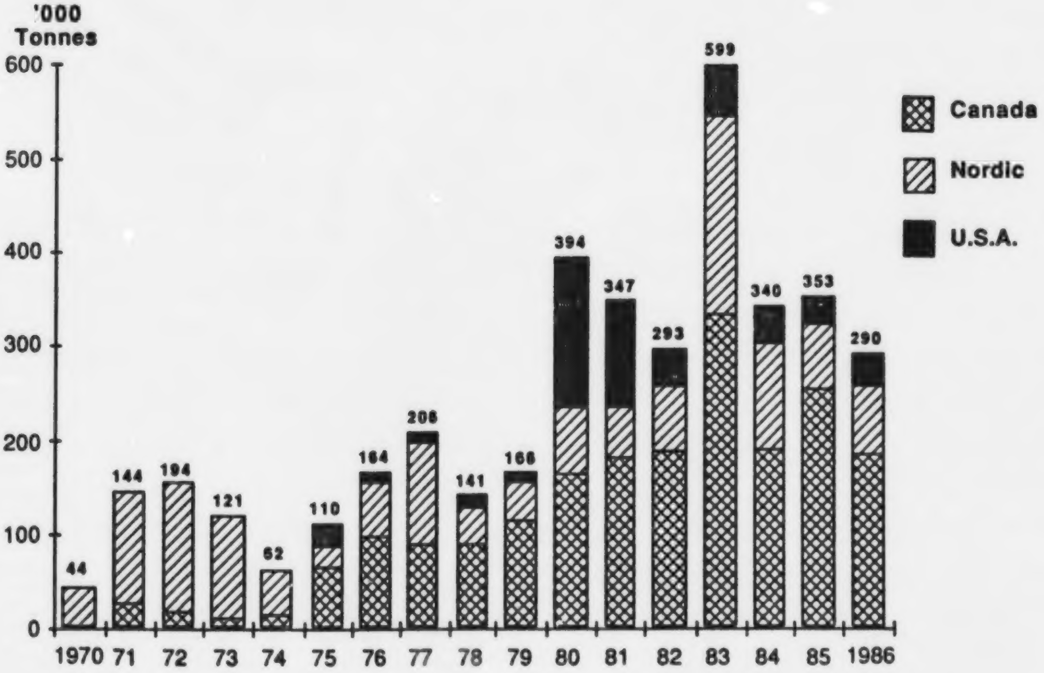
People's Republic of China

Although China is known to have discovered the art of making paper several hundred years ago, available information about the history, extent and structure of today's industry is limited. It is only within the last 10 years that the world's pulp and paper industry has been able to communicate with their Chinese counterparts.

During the 1970s and 1980s depending on the internal political situation, China purchased pulp (Figure 2-7), newsprint and some other grades of paper and board through central government purchasing authorities. As a result sellers had no contact with their end user customers, a difficulty compounded by the fact that the Chinese government officials responsible for purchasing belonged to a separate department to those involved in manufacturing.

Sparse statistics suggest that Chinese production of paper and board was about 4 to 5 million tonnes in 1970, with a small amount of imported pulp being used. The primary furnish was comprised of indigenous non-wood fibres, primarily straw, rags and bagasse. Mechanical wood pulp has been produced for some time, but there is no documented evidence of chemical mills.

Figure 2-7
Chemical Paper Grade Market Pulp Shipments
To The People's Republic of China



In an article written in 1977, a New Zealand consultant (S.D. Richardson) attempted to make capacity estimates based on his travels and from the limited data which was available. He estimated that in 1960 there were over 700 small mills (2 to 5 tpd) and about 80 with a daily output of 10+ tpd. There were no known mills of any significant size.

There were ambitious plans to expand the industry. According to the article some larger mills for both pulp and paper (70 tpd and up) were built in a number of provinces, most of these with the aid of European technologists and engineers.

According to the "China Economic News" (CEN), production of paper and board in 1985 was 8.2 million tonnes and PPI has published similar figures. There seems to have been a strong increase in production during 1986, because the CEN reported that 1986 production was up 10.6 per cent to 9.2 million tonnes. It appears that the threshold of 10.0 million tonnes/year will soon be achieved.

Canada is the prime supplier of market pulp (Figure 2-7), but the high expectations which were generated by record shipments in 1983 have not been realized. Shipments in 1984 and 1986 were below 200,000 tonnes/year, and though some decentralization of buying was granted to some of the provinces, as yet, there are no signs of major increases in 1987.

An enormous potential for paper grade wood pulps exists, but will not be realized on a consistent basis until there is a further expansion and modernization of paper and board production facilities. These continue to be limited by availability of foreign capital and by the decisions of the planning authorities when determining the priority to be given to the paper and board industry.

In the meantime it seems that the Chinese will have to continue to rely on the large number of small mills utilizing local fibre sources to the maximum extent. The ability to expand annual output to raise national per capita consumption of board above the present apparent 9 kg/year will require much larger quantities of chemical pulp and these will have to be imported as the country lacks the timber resources to produce significant new volumes of chemical pulp.

South Korea

In 1970 production of paper and board in South Korea was recorded at 345,000 tonnes, together with a small amount of mechanical pulp. The transformation and expansion of the industry since then to the present time has been remarkable. It is reminiscent, on a smaller scale, of the emergence of the Japanese industry after 1960.

There are now over 30 medium/large paper and board producers and over 100 smaller mills which collectively produce over 700,000 tonnes of products/year. Total production of paper and board in 1985 was 2.3 million tonnes and announced capacity now exceeds 3 million tonnes.

The growth of the industry and the range of products in thousands of tonnes is as follows:

	News-print	**P&W**	**Kraft Paper**	**Board**	**Other**	**Total**
1975	151	132	87	235	52	662
1980	188	293	184	789	165	1,680
1982	244	333	152	844	164	1,737
1984	220	474	174	1,088	250	2,027
1985	239	483	171	1,123	295	2,312

Source: Korea Paper Manufacturers Association

Per capita consumption has risen from 11 kg in 1970 to 56 kg in 1985. The industry is very dependent on exports and is a producer of sack kraft paper and linerboard from waste to effect this. Exports of paper and board have exceeded 100,000 tonnes year in most recent years, and are presently running at higher levels as the Korean industry is able to take advantage of the non-competitiveness of Japanese exports because of the strength of the Yen in adjacent markets.

During the 1970s the Korean industry was production oriented and utilized low grade fibres in order to achieve low cost and high output volume. But in order to compete overseas, and also meet the improving world standards of paper and board production, noticeable upgrading has taken place during the early 1980s.

The Donghae Pulp mill (built by the government to provide a domestic pulp source) produces about 120,000 tpy of chemical pulp. Hardwood chips are imported and local softwoods are used. Initially quality was poor, but it has improved. Korean paper producers are obliged to purchase a share of the mill's output before they can receive pulp import permits.

Waste paper, of which almost 50 per cent of that used is imported, represents 45 per cent of the total paper and board furnish. Imports of paper grade pulp now exceed 550,000 tpy, with the US being the major supplier followed by Canada, which shipped 140,000 tonnes in 1986.

Korean purchasing was originally based on government tenders (OSROK), but evolved to independent contracts between buyers and sellers. Long term contracts are slowly being adopted, but spot buying continues to be a feature of the market. Trading is complicated by foreign currency exchange regulations and local interpretation of credit terms.

Taiwan

Production of paper and board in Taiwan was 380,000 tonnes in 1970 and rose to over 2 million tonnes by 1985, at a pace similar to that of South Korea. In contrast, the per capita consumption in Taiwan increased from 37 kg in 1970 to 107 kg in 1985.

There are approximately 160 paper and board mills in Taiwan, with about 15 dominating the industry and the remainder being small units. Structural and financial problems have changed the industry in recent years, but there are expansion projects underway in all sectors, including pulp.

The drive behind the industry's output is packaging for export of Taiwan products. In fact, Taiwan is a net importer of paper and board.

The country has the advantage of indigenous hardwood and produces over 325,000 tonnes of BHKP, of which about 30 to 35,000 tpy is exported. Bagasse pulp is also produced.

Waste paper is the dominant furnish for Taiwan's paper and board production, accounting for 80 per cent of output. Softwood pulp is imported to supplement the recycled fibres, both in bleached and unbleached grades. The volume of pulp imported has increased significantly in the past few years, as quality requirements are raised for Taiwan's export activities, especially in packaging. In 1986 a record 180,000 tonnes of paper grade pulp was imported from Norscan sources, of which Canada supplied 68,000 tonnes.

Taiwan is an important target market, but in the past it has not been a consistent contract buyer. This will probably change as its dependence on imported pulp increases.

Indonesia

The large population of over 150 million inhabitants in Indonesia has an apparent consumption of only 700,000 tonnes of paper and board, or less than 5 kg per capita annually.

The structure of the paper industry is adversely affected by the lack of industrial organization, lack of suitable financing and other limitations which affect most industrial endeavours in Indonesia. The spread of population over a vast area - many on islands- makes distribution and marketing of products via a limited transportation infrastructure very difficult.

There is no association covering the industry, so historical data are based on estimates only and is not worth detailed analysis except to set the scene for the current position and the future outlook.

Production of paper and board increased from below 100,000 tpy in 1970 to about 230,000 tonnes in 1980. A small amount of pulp was reported to be produced.

According to the PPI annual analysis, paper and board production since 1980 has been:

	Thousands of Tonnes
1980	230
1982	330
1983	377
1984	380
1985	480

It is difficult to reconcile these statistics with the export shipments reported by the far more reliable supplier statistical organizations, such as CPPA and API. It is reported that 215,000 tonnes of waste was used in 1984 and that 170,000 tonnes of pulp was produced domestically. In addition, pulp imports were reported to be 175,000 tonnes. The official Norscan shipments in 1984 were recorded as being about 130,000 tonnes in 1984 and 1985, moving up to 170,000 tonnes in 1986. New Zealand, Taiwan and Brazil also supply this market.

It, therefore, appears that paper and board production is understated. There are 32 paper mills in Indonesia, several of which have been built in the past three years. These include two newsprint machines, which were immediately protected by high import tariffs for newsprint. Total annual paper and board capacity is estimated to be over 850,000 tonnes.

The market is not an easy one to serve, but Canadian shipments have been in the order of 40,000 to 50,000 tpy. The level of imports will depend on whether Indonesia can develop an efficient pulp industry from the abundant wood which exists, much of which is located in remote areas.

Indian Sub-Continent

The purpose of including a brief review of this region is because of the rapidly emerging importance of India as a market pulp target, following the abolition of pulp import tariffs in 1984.

A comparison of production and the apparent consumption of paper and board in the sub-continent during the past 17 years shows that net imports are now running at about 400,000 tonnes per year. Only Bangladesh exhibits self sufficiency.

Table 2-40
Production and Apparent Consumption of Paper and Paperboard
(thousands of tonnes)

Production	**1970**	**1980**	**1982**	**1984**	**1985**
India	885	1,088	1,250	1,367	1,590
Pakistan	136	89	119	105	109
Bangladesh	-	76	73	106	115
Sri Lanka	10	20	22	25	25
Apparent Consumption	**1970**	**1980**	**1982**	**1984**	**1985**
India	1,045	1,088	1,520	1,574	1,740
Pakistan	85	144	225	248	315
Bangladesh	-	66	83	104	110
Sri Lanka	45	37	67	70	70
Net Imports	**144**	**62**	**431**	**393**	**396**

Source: PPI Annual Review

It should be noted that the production data published by PPI and based on reports from their Indian correspondent, are considerably lower than those reported by FAO in 1983 and 1984. The question arises about the accuracy of reporting and the real volume.

It can be seen that there is growth of demand and production, but the economies and living standards of the region are such that per capita consumption is still less than 4 kg/year. The outlook must be for increases, but there is little evidence that this will accelerate or that the volumes will be of any real magnitude for some time.

There are over 250 mills in India, but more than 200 are reported to be "small". Production of pulp for papermaking, most of which was based on non-wood fibres, is reported by FAO to be in excess of 2 million tonnes in India in 1984. This volume was well in excess of the recorded production of paper and board.

Pulp imports from the Norscan countries now amount to over 170,000 tpy, of which about one third originates in Canada. The outlook is for these tonnages to increase, especially for India, but it does not seem likely that this will be rapid or possible to quantify until the structure and financial viability of the paper industry is clarified.

Other Countries

There are several other Asian countries which produce paper and board, but for which recorded history is limited. Recent data are given in Table 2-41.

Table 2-41
Paper and Paperboard
(thousands of tonnes)

	Production	Apparent Consumption	Per/Capita (kg)	Number of Paper Mills
Thailand	350	505	10.1	33
Philippines	218	394	7.0	25
Malaysia	93	382	32.0	13
Singapore	17	290	124.0	2

Source: PPI

All of these countries purchase market pulp. The Philippines have several small chemical pulp mills and Malaysia has both the forest resources and the industrial situation required for future expansion.

Based on the current economic and political situation in the Philippines and Thailand, the outlook for any significant increases in demand is not promising. Malaysia has the potential capacity (installed and proposed) to produce sufficient cultural papers to meet the combined demand of Malaysia and Singapore. These two countries are more economically developed than either Thailand or the Philippines.

Wood Products

Introduction

Unlike the prevailing situation with respect to pulp, paper and paperboard, most of the developing nations of the Asia-Pacific region are self sufficient in wood products. In fact, Malaysia and Indonesia are significant net exporters of lumber and plywood and are expected to remain so over the forecast period. A major exception is China where, due to a deficiency of forest resources under conditions of an expanding economy, the net timber deficit is burgeoning despite an official policy of placing severe restrictions on the use of solid wood products.

China

It has been estimated by the NFPA[1] that in 1985 wood consumption in China reached 299 million m^3 (roundwood equivalent) including 9.3 million m^3 of imports. Of this total, only 25 per cent (76 million m^3) came from within the scope of the Annual State Plan. The vast majority of wood consumption was attributed to unauthorized logging outside the Plan, illegal logging and the unofficial harvesting of firewood. According to the China Ministry of Forestry, only 7 to 8 per cent of the State Plan harvest (4.6 million m^3) is allocated to the production of pulp and paper products, about 8 per cent to fuelwood and the remaining 85 per cent to an extensive range of solid wood products. The wood consumption estimate for 1985 is given in Table 2-42.

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[1] The Market for Softwood Lumber and Plywood in the People's Republic of China, National Forest Products Association, Washington, DC, 1986.

Table 2-42
Estimate of Total Wood Consumption in 1985

(million cubic metres)

	Volume	Per Cent
Annual State Plan		
Domestic production	67	22.4
Imports	9	3.0
Outside the Plan	70	23.4
Firewood	50	16.7
Illegal fallings	103	34.5
Total Consumption	**299**	**100.0**

Source: NFPA

According to the Ministry of Forests, consumption outside the Plan represents the minimum requirement of China's 800 million rural peasants and remains fairly constant. Wood for the industrial sector is assumed to come from within the official State Plan. Although planned consumption doubled from 38 to 76 million m^3 between 1970 and 1985, consumption per unit of GVIAO[1] declined from 0.121 to 0.057 million m^3 per billion Rmb.[2] China's planners forecast that if wood consumption within the Plan can be held at 0.056 (even though 0.80 million m^3 per billion Rmb is considered to be more realistic), planned consumption by the year 2000 will reach 156 million m^3. If the more realistic factor of 0.080 is used, a planned consumption level of 228 million m^3 is indicated. In either case, the increment in official (i.e. within the Plan) demand is enormous (Table 2-43).

Based on interviews and information supplied by the Ministry of Forestry, the NFPA study concludes that if it is assumed that China's ambitious reforestation plans are successful, commercial forest growth (and sustainable harvests) by the year 2000 could reach 210 million m^3. If it is further assumed that illegal felling in the commercial forests can be eliminated (103 million m^3 in 1985) and that commercial fellings outside the plan plus firewood harvesting can be reduced to 110 million m^3 (120 million in 1985) then the available supply for planned harvesting from commercial forests will be 100 million m^3 (Table 2-43).

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[1] Gross value of industrial and agricultural output. Similar to GDP.

[2] China's currency unit is the Renminbi.

Given a target consumption within the Plan of 0.056 million m^3 per billion Rmb, the planned import requirement would be 56 million m^3 (roundwood equivalent). At the more realistic consumption rate of 0.080 million m^3, the import requirement would be in the area of 130 million m^3. Actual imports will depend upon many variables, not the least of which are the performance of the National economy, the availability of foreign exchange to pay for the imports and year-to-year state priorities for the use of this foreign exchange. One important fact that the NFPA study makes clear is that even under the most intensive levels of plantation establishment and forest management, China's timber resources cannot sustain the harvest required to meet minimum levels of projected consumption. As the NFPA appropriately points out, the market is controlled by political and economic planning factors rather than by consumer demand.

Table 2-43
Roundwood Consumption
Domestic Supply and Imports
(million cubic metres)

	At 0.056 million m^3 per billion Rmb[1] 1985	At 0.056 million m^3 per billion Rmb[1] 2000	At 0.080 million m^3 per billion Rmb[2] 2000
Within the State Plan			
planned fellings	67	100	100
imports[3]	9	56	128
Planned consumption	**76**	**156**	**228**
Outside the State Plan			
commercial fellings	70	70	70
firewood	50	40	40
Rural requirements	**120**	**110**	**110**
Illegal logging	103	0	0
Total Supply	**299**	**266**	**338**
Domestic Supply	**290**	**210**	**210**

[1] Target consumption rate
[2] Realistic consumption rate
[3] Roundwood equivalent

Source: NFPA data

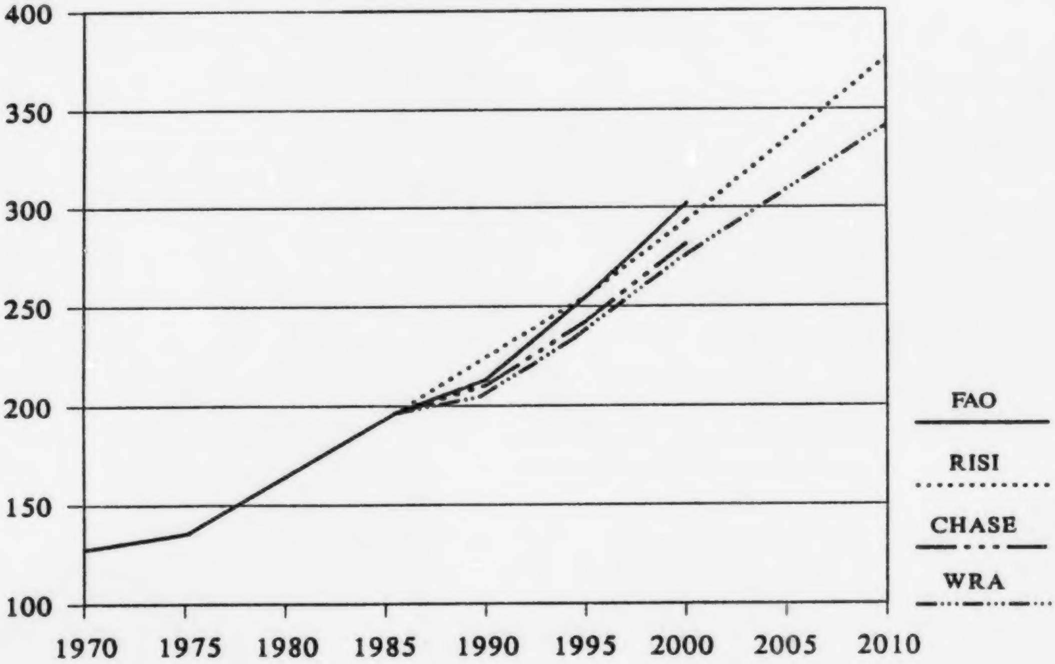
DEMAND OUTLOOK TO THE YEAR 2010

In developing the analyses presented in Volumes III and IV, we extended our analyses to the year 2010. As a prelude to these volumes, we provide below a summary of the overall projections for paper and paperboard, market pulp and lumber.

Paper and Paperboard

The detailed analyses presented in Volume III indicate that world demand for paper and paperboard is expected to increase by almost 150 million tonnes over the 1985-2010 period, with an annual growth rate averaging 2.3%. A global forecast to the year 2000, together with regional and broad product group breakdowns was provided earlier in this volume. These forecasts and a regional breakdown are now extended to the year 2010 in Figure 2-8 and Table 2-44 respectively.

Figure 2-8
World Paper and Paperboard Consumption
History and Forecast
1970 - 2010
(millions of tonnes)



Source: WRA

Table 2-44
Current and Projected Apparent Consumption of Paper and Paperboard by Region

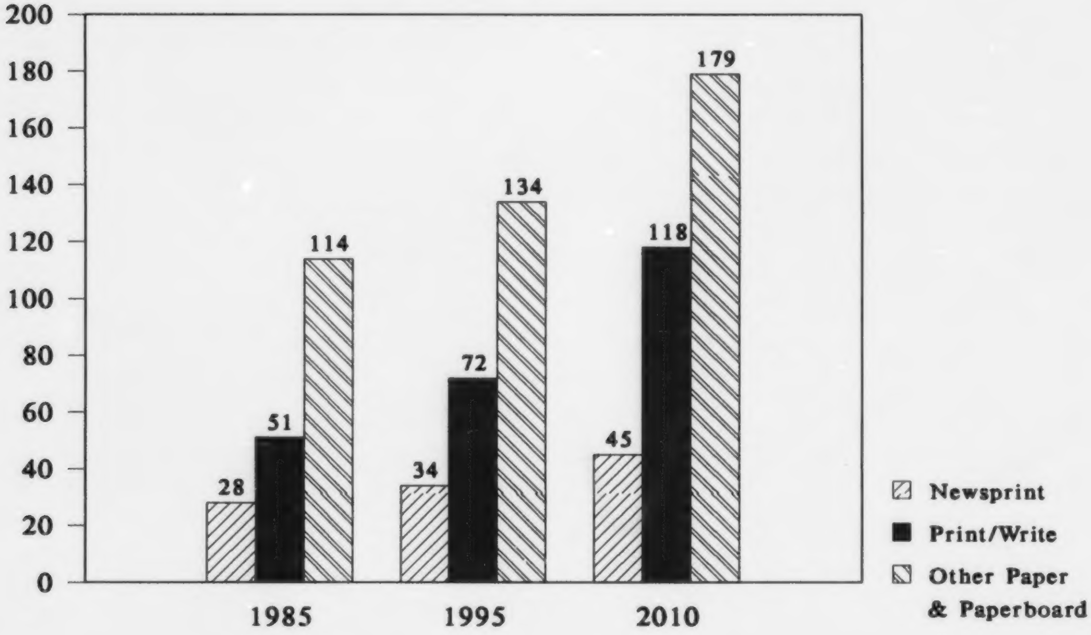
(millions of tonnes)

				Volume Change		Annual Growth (%)	
	1985	1995	2010	1985-1995	1995-2010	1985-1995	1995-2010
North America	**73.1**	**86.0**	**114.4**	**12.9**	**28.4**	**1.6**	**1.9**
Canada	5.2	6.0	6.9	0.8	2.2	1.4	.9
US	67.9	80.0	106.5	12.1	26.2	1.7	1.9
Western Europe	**46.4**	**56.3**	**74.6**	**9.9**	**18.3**	**2.0**	**1.9**
Nordic	3.7	4.7	6.2	1.0	1.5	2.4	1.9
Others	42.7	51.6	68.4	8.9	16.8	1.9	1.9
Latin America	**10.4**	**15.2**	**30.3**	**4.8**	**15.1**	**3.9**	**4.7**
Brazil	3.7	5.8	12.9	2.1	7.1	4.6	5.5
Chile	0.3	0.5	1.2	0.2	0.7	5.2	6.0
Others	6.4	8.9	16.2	2.5	7.3	3.3	4.1
Asia-Pacific	**30.8**	**41.4**	**61.8**	**10.6**	**20.4**	**3.0**	**2.9**
Japan	20.3	26.0	38.1	5.7	12.1	2.5	2.6
Dev. Oceania	2.9	3.3	4.9	0.4	1.6	1.3	2.7
Others	7.6	12.1	18.8	4.5	6.7	4.8	3.0
Africa and Middle East	**4.7**	**5.6**	**7.6**	**0.9**	**2.0**	**1.7**	**2.1**
Centrally Planned	**27.2**	**35.5**	**53.3**	**8.3**	**17.8**	**2.7**	**2.7**
USSR	9.7	12.0	15.8	2.3	3.8	2.2	1.9
Eastern Europe	5.9	7.3	9.6	1.4	2.3	2.2	1.8
China	11.4	15.9	27.3	4.5	11.4	3.4	3.7
Other C.P. Asia	0.2	0.3	0.6	0.1	0.3	4.1	4.7
World Total	**192.6**	**240.0**	**342.0**	**47.4**	**102.0**	**2.3**	**2.4**

Source: WRA

The growth outlook scenario to the year 2010 (Figure 2-9 and Table 2-45) envisages overall growth averaging 2.3% per annum over the period 1985-2010. Newsprint is expected to increase at a 1.9% rate while printing and writing grades will continue at a more rapid 3.4% rate. Other paper and paperboard is also expected to show a more modest 1.8% growth rate.

Figure 2-9
World Paper and Paperboard Consumption
By Product 1985 - 2010
(millions of tonnes)



Source: WRA

Table 2-45
World Paper and Paperboard Consumption and Growth Rate
By Product 1985-2000
(millions of tonnes)

	1985	2010	Annual Growth (%)[1]
Newsprint	28.1	45.4	1.9
Printing and Writing	51.4	118	3.4
Other paper and paperboard	113.1	178.6	1.8
Total	**192.6**	**342.4**	**2.3**

[1] Compound annual average

Source: WRA

These global projections are discussed strategically in Volume I and detailed in Volume III.

MARKET PULP

Overview of World Total Pulp Production

The increased production of paper and paperboard identified in the previous section will result in an increased demand for woodpulp, non-wood fibres and waste paper. As a basis of considering the future supply of market pulp, an overview of the world's total pulp production is presented to show its international aspect, and the dominance of specific regions in production.

Total pulp includes all wood based paper and dissolving pulp grades, as well as non-wood fibres used for paper and paperboard manufacture (such as bagasse, bamboo, kenauf, cotton linters and straw). Although non-wood fibres are not used to any extent in the industrialized countries, they are established wood substitutes in many developing regions.

Table 2-46 illustrates the trends in total paper grade woodpulp production by region. North America will continue to be the world's largest producer, but significant increases are expected to occur in Latin America because of the availability of relatively low cost plantation grown hardwoods (Brazil) and softwoods (Chile).

There will also be increases in Western Europe (Spain and Portugal for hardwoods and Northern Europe for softwoods). In the Asia-Pacific region, maturing plantations of softwood in New Zealand, native eucalyptus in Australia, and some tropical plantations in South East Asia (e.g. Indonesia, Malaysia and Thailand) will provide additional pulp fibre. The Centrally Planned countries (mainly the USSR from natural forests), will also increase pulp production. The relatively large estimated increase of paper pulp in China to the year 2010 will be mostly in non-wood fibres.

The fact that pulp demand did not move at the same rate as world paper and paperboard production in the period 1980-1986 is indicative of the increased consumption of waste paper and/or fillers in the place of woodpulp.

Table 2-46
World Production of All Grades of Pulp
(millions of tonnes)

Country	Actual 1980	Actual 1986	Annual Growth 1980-86 (%)	Forecast 1995	Forecast 2000	Annual Growth 1995-2000 (%)
N. America	**65.8**	**73.6**	**1.9**	**82.2**	**90.6**	**2.0**
USA	45.9	51.9	2.1	56.0	60.0	1.4
Canada	19.9	21.7	1.5	26.2	30.6	3.2
Nordic	**17.4**	**19.3**	**1.7**	**22.6**	**24.1**	**1.3**
Sweden	8.7	9.4	1.3	11.4	11.9	.9
Finland	7.2	7.9	1.6	9.0	9.8	1.7
Norway	1.5	2.0	4.9	2.2	2.4	1.8
Other W. Europe	**9.7**	**10.7**	**1.7**	**12.7**	**13.7**	**1.5**
Latin America	**5.8**	**6.9**	**2.9**	**10.0**	**14.0**	**7.0**
Asia-Pacific	**13.1**	**14.1**	**1.2**	**18.0**	**21.3**	**3.4**
Japan	9.8	9.2	1.1	10.0	11.0	1.9
Dev. Oceania	2.0	1.9	(.1)	3.0	3.6	3.7
Other	1.3	3.0	15.0	5.0	6.7	6.0
Africa/Middle East	**1.5**	**2.4**	**8.2**	**3.5**	**4.3**	**4.2**
E. Europe/USSR	**13.3**	**12.8**	**(.6)**	**14.0**	**16.0**	**2.7**
China	**3.6**	**6.7**	**10.9**	**11.0**	**13.0**	**3.4**
Total World	**130.2**	**146.5**	**2.0**	**174.0**	**197.0**	**2.5**

Source: PPI, WRA Estimates

North America and Scandinavia produce 63% of the world's output of paper grade pulps. Japan, which is the world's fourth largest pulp producing country, has considerable independence because of domestic pulp availability, although annual production growth is now relatively static.

The surplus position of North American paper grade woodpulp producers will increase through the year 2010. There will be additional production of hardwoods through expansions of existing mills and new greenfield capacity for chemi-mechanical and chemical pulps.

Western Europe's deficit position will increase. The Nordic countries will continue to increase paper production, and will therefore consume more domestic pulp at the expense of some market pulp supply to other Western European paper producers.

The Asia-Pacific regional pulp deficit will grow due to a relatively higher increase in the production of paper and paperboard. Meaningful new pulp capacity in this region will not be available until at least the mid 1990s.

The anticipated demand pattern is shown in Table 2-47 and the estimated regional surplus or deficit position is shown in Table 2-48.

Table 2-47
World Consumption of Paper Grade Woodpulp
(millions of tonnes)

				Increment	
Country	**1985**	**1995**	**2010**	**1985-1995**	**1995-2010**
North America	62.6	75.0	92.7	12.4	17.7
Western Europe	31.9	39.2	50.1	7.3	10.9
Latin America	4.6	7.4	17.0	2.8	9.6
Asia-Pacific	15.2	20.4	31.9	5.2	11.5
Africa/Middle East	1.5	2.3	3.9	0.8	1.6
Centrally Planned	13.6	16.5	19.7	2.9	3.2
World Total	**129.4**	**160.8**	**215.3**	**31.4**	**54.5**

Source: WRA Estimates

North America and Western Europe (including the Nordic countries) will account for 66% of total pulp consumption by 2010 vs 73% in 1985. These regions will account for 55% of the incremental pulp consumption from 1985-2010, indicating the growth of pulp requirements by other paper producing regions.

Table 2-48
Current and Projected Regional Self-Sufficiency for Paper Grade Wood Pulp
(millions of tonnes)

	Apparent Surplus or (Deficit)			Projected Change	
	1985	1995	2010	1985-95	1995-2010
North America	5.7	7.2	13.7	+1.5	+6.5
Western Europe	(3.0)	(3.9)	(6.7)	-0.9	-2.8
Latin America	1.2	2.6	5.0	+1.4	+2.4
Asia-Pacific	(2.9)	(5.6)	(11.7)	-2.7	-6.1
Africa and Middle East	0.5	(0.1)	(0.3)	-0.6	-0.2
Centrally Planned	0.1	(0.2)	ns	-0.3	+0.2

Source: WRA estimates
ns not significant (less than 0.5)

Trends in Grades Demanded and Future Outlook

Table 2-49 illustrates the expected consumption of paper grade woodpulp by grade to the year 2010.

Table 2-49
World Apparent Consumption of Paper Grade Pulps
(millions of Tonnes)

Grade	Actual		Annual Growth	Forecast		Annual Growth
	1980	1986	1980-86 (%)	1995	2010	1995-2010 (%)
Bleached Softwood Kraft	23.89	28.94	3.2	34.4	46.7	2.1
Bleached Hardwood Kraft	18.25	25.60	5.8	33.1	52.7	3.2
Sulphite	11.63	10.31	(2.0)	9.4	5.0	(4.1)
Unbleached Kraft	33.55	33.35	(0.1)	36.9	46.8	1.6
Semi Chemical	8.24	7.63	(1.3)	8.6	10.9	1.6
Mechanical	26.65	30.78	2.4	38.4	53.2	2.2
Total World	**122.21**	**136.61**	**1.9**	**160.8**	**215.3**	**2.0**

Source: WRA Data Base, RISI

LUMBER AND WOOD BASED PANELS

Regional Demand Growth/Changes

World demand for wood products (lumber and wood based panels) is forecasted to show a moderate rate of growth during the 1990s. The Western Pacific Rim countries are forecasted to provide the highest growth rates in demand for wood products due to rapid industrialization, increases in per capita consumption with increasing standard of living and population growth. Demand in these rapidly developing regions will come in domestic shelter, both new and better housing, furniture, cabinets and other products made for consumption and packaging for their export oriented economy.

North American and European market places, though very significant in terms of size and existing wealth, are forecasted to provide modest growth in the coming decade due to static or declining population growth rates, aging populations passing the home formation years, an adequate stock of recently upgraded houses and post industrial economies. Renovation and repair to the existing housing in these markets will continue to represent a major usage of wood products in this region.

Japan is forecast to offer modest growth in lumber consumption which, due to constraints to domestic production, will largely be supplied by imports. The increasing acceptance of the wood platform frame style of house construction is expected to continue.

Per Capita Consumption Growth

While developed countries have considerably higher per capita rates of consumption of lumber and panel products, it is the developing, industrializing countries which will be offering both significant per capita growths in consumption and net growths in population.

While the US consumed 60% of the Pacific Rim lumber markets softwood total and 34% of the hardwood total through the 1980s, US consumption will only grow modestly in the 1990s. Through the 1990s the fastest rates of growth of wood product consumption are forecasted to be for Taiwan, Korea, Mexico, China and Oceania.

Use Sector Growth/Changes

New and upgraded residential shelter and furnishing, combined with industrial packaging is expected to represent the principal growth use-sectors. The growth rate of panel products is expected to exceed that for lumber. Technology will permit greater utilization of smaller, lower quality trees for a family of reconstituted wood based panels.

Lumber

The major existing world markets for lumber - North America, Japan and Europe - have developed supplier countries who have competitive sourcing of raw materials, processing and distribution networks. This infrastructure was adequate for the peak demands of the post-war baby-boom housing.

Lumber processing technology has permitted exceptional gains in productive capacity of sawmills such that those traditional supply countries must search for addition and growing markets as North American and European demand stagnates. The obvious growth markets of the Western Pacific Rim countries would provide an ideal outlet for this surplus capacity. However, that region has yet to develop sufficient surpluses of cash from their industrialization to pay. In addition those countries have traditionally favoured the locally available raw materials of bricks and stone for their residential building materials.

The 1990s will see the overcapacity of North American lumber production finding increasing markets in the Western Pacific Rim. If the relatively slow acceptance of the North American stud-and-platform style of house construction in Japan is representative, it will be the wood based panel aspect of housing more than lumber that will initially attract wood exporting countries to the Western Pacific Rim.

Lumber for wooden framed housing, such as the stud-and-platform style North American practice will slowly gain acceptance in the developing countries. The rate of acceptance of stud-and-platform construction in Japan has been slow in spite of intensive marketing by COFI. Traditional skills and abundant stone and brick will slow the transition to wood in other regions.

Wood Based Panel Products

The panel sector - plywood, OSB/waferboard, particleboard, MDF and to a lesser extent hardboard (utilizing both hard and soft woods) - is forecasted to exhibit a faster rate of growth than lumber. Major reasons for this trend include cost-effectiveness, availability and utilization of declining size and quality of the resource, especially in those countries lacking a commercial timber base.

Panel products for sheathing, siding, roofing, flooring and containers are already in widespread use and have fewer competitive alternatives.

Analysis of the wood based panel demand outlook is complicated by the fact that traditional end usage and hence demand for panel products, especially structural applications, are largely focussed on the North American marketplace.

The trend to substitute plywood with lower cost evolving alternatives such as OSB/waferboard will continue through the 1990s. Technology can be expected to slow the economic decline of plywood by permitting more efficient, less labour intensive manufacture of plywood from the declining resource size and quality.

Traditional markets for plywood - US, Canada and Oceania - will experience a loss in plywood demand and a growth in demand and supply of OSB/waferboard in the next decade. Plywood will maintain its market in specialty appearance applications such as furniture, panelling and cabinetry. In addition many plywood users are in less price-sensitive use sectors and are willing to pay the premiums for plywood.

OSB/waferboard usage will exceed that of plywood for the important use sectors of domestic shelter external sheathing, roofing, flooring and concrete formwork as well as for packaging and containers. Once the problems of surface telegraphing of surface irregularities is overcome, attractive overlays in either plastic or thin exotic veneers is expected to further encroach plywoods market share.

Less developed countries of the Pacific Rim especially South East Asia, Korea and China are forecasted to experience significant growth in their domestic consumption of mainly domestically produced plywood.

Medium density fibreboard (MDF) demand is expected to grow significantly in Southeast Asia, Taiwan and China with medium growth in demand in Canada, Korea and Mexico. MDF is ideal for interior use in furniture cabinetry and fixtures. MDF's growth is forecasted to more than offset hardboards decline.

Particleboard demand growth rate is forecasted to be slower than for MDF, however, proposed higher grade particleboard panels could narrow that competitive gap.

Hardboard shows the least significant growth of the reconstituted panel family. In its application as an exterior siding material, hardboard is slowly losing share to vinyl and aluminum. Hardboard usage in the furniture and Do-It-Yourself (DIY) areas is also forecasted to continue to decline. Due to these declines, hardboard plants are not receiving research and development attention and many production facilities are aging prior to being shut down permanently.

APPENDICES

A $US IN TERMS OF OTHER MAJOR CURRENCIES -- 1970-1988

B GLOSSARY OF TERMS

C DEFINITIONS AND REFERENCES

D INDEX OF COUNTRIES

APPENDIX A

APPENDIX A

$US IN TERMS OF OTHER MAJOR CURRENCIES -- 1970-1988

AS OF August 9th, 1988

	$C/$US	DM/$US	Pound/ $US	FF/$US	LiraIt/ $US	Yen/$US	SK/$US	FM/$US	NK/$US	Aus/$US	$NZ/$US	Won/$US	Pes./$US	Escuda/ $US
1970	1.0440	3.6465	0.4173	5.5287	627.2	358.0	5.1837	4.1995	7.1409	0.8942	0.8839	247.0	70.07	28.74
1971	1.0098	3.4772	0.4090	5.5090	618.4	346.9	5.1026	4.1970	7.0174	0.8773	0.8749	267.0	69.64	28.59
1972	0.9905	3.1869	0.3994	5.0407	583.2	302.9	4.7552	4.0998	6.5858	0.8379	0.8348	296.4	64.32	27.25
1973	1.0000	2.6441	0.4076	4.4307	583.0	270.6	4.3459	3.8285	5.7208	0.7026	0.7332	303.4	58.14	25.71
1974	0.9779	2.5838	0.4273	4.8054	650.3	291.6	4.4329	3.7757	5.5186	0.6942	0.7128	301.3	57.86	25.19
1975	1.0173	2.4549	0.3921	3.6873	652.8	296.8	4.1421	3.6873	5.1930	0.7632	0.8224	375.1	57.47	25.45
1976	0.9861	2.5156	0.5536	4.7707	832.3	296.4	4.3536	3.8429	5.4511	0.8187	1.0044	383.6	66.63	30.03
1977	1.0635	2.3190	0.5727	4.9122	882.4	267.2	4.4722	4.0102	5.3228	0.9010	1.0287	392.1	75.96	38.17
1978	1.1402	2.0035	0.5209	4.4978	848.7	208.1	4.5121	4.1704	5.2351	0.8732	0.9633	420.4	76.52	43.88
1979	1.1715	1.8322	0.4713	4.2538	830.9	218.0	4.2709	3.8643	5.0627	0.8942	0.9772	431.9	67.33	49.02
1980	1.1690	1.8141	0.4298	4.2187	856.4	225.5	4.2278	3.7182	4.9159	0.8770	1.0262	540.9	71.72	50.00
1981	1.1990	2.2547	0.4937	5.1974	1136.8	220.0	5.0338	4.3507	5.7261	0.8696	1.1499	622.0	92.23	61.35
1982	1.2341	2.4265	0.5719	6.5469	1352.5	248.5	6.2203	4.7870	6.4176	0.9836	1.3306	687.3	101.16	78.74
1983	1.2324	2.5494	0.6596	7.5887	1518.8	237.5	7.6642	5.5614	7.2923	1.1089	1.4958	728.2	143.30	109.89
1984	1.2948	2.8370	0.7484	8.7075	1757.0	237.3	8.2577	5.9889	8.0976	1.1372	1.7262	794.9	161.85	147.06
1985	1.3652	2.9190	0.7713	8.9054	1909.4	236.7	8.5846	6.1834	8.5539	1.4259	2.0044	904.7	170.85	169.49
1986	1.3895	2.1626	0.6831	6.9128	1634.7	167.4	7.1182	5.0655	7.3869	1.4899	1.9044	932.9	140.35	151.03
1987	1.3219	1.7920	0.6054	5.9962	1311.0	143.6	6.3126	4.4036	6.6865	1.4118	1.6548	824.0	124.96	141.78
88 Jan	1.2853	1.6542	0.5555	5.5836	1168.5	127.3	5.9756	4.0356	6.3537	1.4054	1.5175	787.6	112.75	135.30
Feb	1.2879	1.6967	0.5688	5.7320	1267.9	129.4	6.0463	4.1112	6.4101	1.4005	1.5044	776.9	114.23	139.33
Mar	1.2492	1.6768	0.5445	5.6886	1240.5	127.1	5.9458	4.0441	7.3613	1.3845	1.5091	753.9	112.54	137.49
Apr	1.2315	1.6663	0.5309	5.6544	1237.7	124.5	5.8644	3.9881	6.1855	1.3321	1.5054	740.5	110.35	136.23
May	1.2369	1.6943	0.5352	5.7342	1259.5	124.8	5.9039	4.0210	6.1812	1.2844	1.4497	741.5	111.93	138.21
June	1.2174	1.7570	0.5627	5.9241	1309.0	127.4	6.0961	4.1606	6.3838	1.2383	1.4272	729.4	116.05	143.19
July	1.2073	1.8466	0.5867	6.2232	1367.3	124.0	6.3475	4.3801	6.7110	1.2502	1.4958	725.5	122.15	150.27

APPENDIX B

APPENDIX B
GLOSSARY OF TERMS

Basis Weight Area	Weight of paper or paperboard per unit area e.g. newsprint = 48.8 g/m^2
C&F	Cost and freight
CIF	Cost, insurance and freight
CPPA	Canadian Pulp and Paper Association
DG-4	Legislation implemented by the EEC which ensured that a certain proportion of pulp sales into these countries be conducted in domestic currencies. Passed as a result of alleged price fixing in $US.
ECE	Economic Commission for Europe (UN)
EEC	European Economic Community
EFTA	European Free Trade Association
ETTS IV	European Timber Trends, Fourth Report, ECE
FAO	Food and Agricultural Organization of the United Nations (Yearbook of Forest Products)
FOB	free on board
furnish a) paper	The various components, comprising pulps, waste papers, fillers and extenders, used in papermaking
b) pulp manufacture	Wood or other fibres (e.g. agricultural) used in pulp
g/m^2	grams per square metre
GATT	General Agreement on Trade and Tariffs
GNP/GDP	Gross National Product/Gross Domestic Product
GRWD	Groundwood or mechanical pulp products
IMF	International Monitary Fund, (International Financial Statistics)
kg	kilogram
kWh	kilowatt hour
LWC	lightweight coated paper (#5 wood-containing)

m^3	cubic metre
MDF	medium density fibreboard
mfbm	thousand feet board measure
NFPA	National Forest Products Association (USA)
Norscan	Canada, USA, Sweden, Finland, Norway
na	not available
n/a	not applicable
ns	not significant
NTB	Non-tariff barrier(s)
OSB	Oriented Strand Board
OSROK	Office of Supply, People's Republic of Korea
P&W	Printing and writing grades
%	per cent
PPI	Pulp and Paper International
RISI	Resource Information Systems Inc.
SC A/B	Supercalendered paper; A and B grades
tpd	metric tons per day
tpy	metric tons per year
$US	US dollar
$Cdn.	Canadian dollar
WCP	White Chemical Pulp
WRA	Woodbridge, Reed and Associates

APPENDIX C

APPENDIX C
DEFINITIONS AND REFERENCES

A. Pulp Categories

Market

Market pulp is pulp sold in competition with other suppliers where there is no control of the buying/ selling decision of one party by the other. The definition includes all pulp sold to overseas markets (NORSCAN).

Affiliated

This category is usually dried, but can be in wet-lap or slushed form if moved to a nearly affiliated operation. It is basically in-house transactions of captive pulp.

Integrated

The pulp is manufactured on-site and passed to an adjacent paper machine. From time to tome, when the paper machines are not at full capacity, an integrated mill may sell incremental tonnage as market pulp (also known as "swing" tonnage).

B. Calculation of Annual Capacity

Woodpulp - Total

For each market pulp mill annual woodpulp capacity is usually estimated by determining the best average daily production rate sustained over a given period of time (eg. 3-6 months). That figure is then multiplied by the expected number of operating days in the years ahead to obtain the mill's basic annual capacity. Changes that would affect a mill's future capacity should be determined by means of an annual survey of mills.

Woodpulp - Market

For mills which produce only market pulp, capacities are estimated using the total woodpulp method as described above. Adjustments are made for mills which use some portion of their pulp for their paper machines or which have papermaking affiliates to which they ship pulp.

C. Wood References

Annual Allowable Cut (AAC)

The annual volume of timber that may be harvested from a given forest land base over a given period of time.

Hog Fuel

Wood residue that has been processed by a "hogging" machine for use as fuel.

Roundwood Chips

Chips made from primary roundwood bolts and logs.

Forest Residues

All logging residues such as portions of bolts or logs less than the minimum diameter specified by the consuming mill and poles, saplings, slash, limbs, twigs or portions of bolts or logs not regarded as merchantable in normal pulpwood or sawlog operations. May also include merchantable portions of tress that will not be used for higher value products. Chips made from forest residues.

Manufacturing Residues

All mill residues such as slabs, edgings, trimmings, cores, planer shavings, sawdust or other wood residues of a wood manufacturing process and chips made from these residues.

D. Pulp Grade Abbreviations

BSP	Bleached sulphite pulp
BKP	Combination of softwood and hardwood bleached kraft pulp sulphate
BSKP	Bleached softwood kraft pulp
BHKP	Bleached hardwood kraft pulp
UBK	Unbleached kraft pulp (usually softwood)
BCTMP	Bleached chemi-thermomechanical pulp
CTMP	Chemi-thermomechanical pulp
TMP	Thermomechanical pulp
GW and/or SGW	Mechanical groundwood or stone groundwood

E. Fibre References

1. Woodpulp

Dissolving and Special Alpha

Highly refined bleached white sulphite or sulphate pulp with a high content of alpha (pure cellulose) fibre.

Sulphite Paper Grades

Paper grade pulps produced by the sulphite process. Bleached pulp must achieve a G.E. brightness of more than 75.

Sulphate and Soda Paper Grades

Paper grade pulps produced by the sulphate or soda process. Bleached pulp must achieve a G.E. brightness of more than 75. Semi-bleached pulp must achieve a G.E. brightness of not less than 45 or more than 75.

Semi-chemical

High yield pulps produced with the use of some chemical agent such as neutral sulphite (NSSC); alkaline cook; chemi-pulp (defibrated pulp put through reaction chambers); chemi-mechanical pulp with a yield usually above 60 per cent.

Mechanical

Fine textured, usually bright pulps used in paper and paperboard manufacture and produced by mechanical rather than chemical processes.

Stone Groundwood

Pulp produced by grinding wood logs or bolts (usually 4 feet in length) into relatively short fibres.

Refiner

Pulp produced by subjecting wood chips and/or residues to atmospheric or open discharge refining.

Thermomechanical

A high yield pulp produced by a thermomechanical process in which wood particles are softened by preheating under pressure prior to a pressurized primary refining stage. Usually replaces or reduces the chemical pulp component in newsprint or groundwood papers.

2. Other

Cotton liners, cotton linter pulp, textile mill waste and cuttings, rags, waste rope and cordage, bagasse, flax, straw, jute, esparto, kenaf and all other vegetable fibres used in paper and paperboard manufacture.

3. Recyclable (Waste Paper)

Mixed Papers

Numbers 1 and 2 mixed papers, super mixed papers, boxboard cuttings, mill wrappers.

Newspapers

Number 1 news, over-issue news, super news. Any grade to be used as a news substitute.

Corrugated

Old containers both corrugated and solid fibre; container-board plant cuttings.

Pulp Substitutes and High Grade Deinking

Includes ledger, tabulating cards, bleached sulphate shavings (unless used as a news substitute). Envelope and bleached sulphite and sulphate cuttings, coated book stock, news and publication blanks, kraft paper and bags and all other grades not classified above.

Print free grades are reported as pulp substitutes and printed grades, if deinked, are reported as high grade deinking.

F. Paper Grades

Newsprint

Paper used chiefly in the printing of newspapers, made largely from mechanical pulp and weighing not less than 45 gsm nor more than 55 gsm.

Uncoated Groundwood or Uncoated "Wood-containing" UCWC

Uncoated papers containing more than 10 per cent groundwood or other mechanical pulps in their furnish, excluding newsprint (eg. sc, "super news").

Coated Groundwood or Coated "Wood-Containing" CWC

Coated papers containing more than 10 per cent mechanical pulp (mostly stone groundwood and/or refiner) in their furnish (eg. LWC).

Uncoated Freesheet or Uncoated "Woodfree" UWF

Bleached uncoated printing and writing papers containing not more than 10 per cent groundwood or other mechanical pulps in their furnish, i.e offset, tablet, envelope, business paper (bond, ledger, memo, duplicator), form bond, cover, text and related papers.

Machine and Off Machine Coated

Bleached papers with a coating weight of at least 4 gsm on either side and at least 50 per cent of the coating consisting of clay (Kaolin) or similar material.

Coated Freesheet or Coated "Woodfree" CWF

Coated papers containing 10 per cent or less mechanical pulp (mostly stone groundwood and/or refiner) in their furnish.

Thin Papers

Includes carbonizing, condenser, cigarette, bible and similar papers.

G. Paperboard Grades

Container Chip and Filler Board

Recycled paperboard manufactured as a filler for solid fibreboard for conversion into solid fibre boxes and other container chipboard (all chipboard under 26 pounds per 1000 square feet manufactured for use as facing corrugated, solid fibre and single faced products which are used for interior packing, eg. pads, partitions, dividers, layers and cushioning.

Semi-chemical Paperboard

Paperboard made form a furnish containing not less than 75 per cent virgin woodpulp, the predominant portion of which is produced by a semi-chemical process.

Set-up

Recycled paperboard manufactured with non-bending specifications for conversion into rigid or set-up boxes (including plain chipboard, newslined, white vat lined).

Solid Bleached Packaging Paperboard

Paperboard made for use in packaging from a furnish containing not less than 80 per cent virgin bleached woodpulp. Bleached bristols not manufactured for packaging are included in the proper bleached bristol classifications under paper.

Unbleached Kraft Paperboard

Paperboard made from a furnish containing not less than 80 per cent woodpulp produced by the kraft sulphate process.

Corrugating Medium

Produced from a furnish containing less than 75 per cent virgin woodpulp and recycled paperboard, used as the fluting material when combining paperboard for conversion into corrugated boxes.

Folding

Paperboard manufactured, such as clay coated unbleached kraft and bleached lined unbleached kraft backed, for conversion into folding cartons and beverage containers.

Food Board

Solid bleached paperboard for conversion into folding cartons such as folding cartons for ice cream, butter, oleo-margarine, frozen foods and bakery products.

Tissue

Includes sanitary grades: i.e. toilet, facial napkin, toweling, sanitary papers, and waxing, wrapping and miscellaneous grades.

Bleached Bristols

Includes tabulating index, tag and file folder, coated cover bristols and uncoated bristols (index, printing and postcard).

Specialty Packaging

Paper and board of all weights and furnishes, usually used as protective packing for food and other consumer products such as bakery bags, fast food and frozen food wraps. Also includes glassine, greaseproof and vegetable parchment paper.

Bleached Packaging and Industrial Converting

Paper made for similar end uses as unbleached kraft, but made from bleached and semi-bleached sulphate and unbleached sulphite pulps. Wrapping paper, shipping sack, and other converting papers.

Unbleached Kraft

Paper containing more than 80 per cent unbleached sulphate wood pulp - wrapping paper, shipping sack, grocers sack and other bag, and other converting papers 18 pounds and over (24 x 36 - 500).

Flat Sheet: Paper produced without embossing or creping of any type.

Extensible: paper produced using a micro-creping process to increase M<D stretch.

Packaging and Industrial Converting

Wrapping paper, shipping sack, bag and sack other than shipping sack, and other converting papers - 18 pounds and over.

Special Industrial

Paper and board, of all weights, calipers and furnishes, designedfor specialized end uses and manufactured to exact customer specifications; includes abrasive paper, electrical insulation, filter paper and similar grades. Does not include wet machine board.

Cotton Fibre

Papers containing 25 per cent or more in their furnish of cotton, cotton rags, cotton waste, linters, linter pulp, flax or similar fibres.

Linerboard

Unbleached kraft paperboard manufactured for use as facing material when combining paperboard for conversion into corrugated or solid fibre boxes. Includes solid unbleached kraft linerboard, both foudrinier and cylinder, mottled white linerboard and clay coated unbleached kraft linerboard.

Milk Carton and Food Service

Solid bleached paperboard for conversion into milk cartons, heavyweight cups, round nested food containers, plates, dishes and trays and for packaging for moist, liquid and oily foods.

Other

All unbleached kraft paperboard whose end use is not otherwise classified, such as board for a filler for solid fibreboard to be fabricated into a shipping containers, tube, can drum, file folder, tag, automotive panel, etc.

Recycled Paperboard/Bogus

Paperboard manufactured from a combination of recycled fibres from various grades of paper stock with the predominant portion of its furnish being recycled fibres: sometimes including a very minor portion of virgin fibres.

APPENDIX D

INDEX OF COUNTRIES

Region	Countries
North America	Canada
	United States
Western Europe	Scandinavia
	Finland
	Norway
	Sweden
	Others
	Austria
	Belgium-Lux.
	Denmark
	France
	Germany (FRG)
	Greece
	Iceland
	Ireland
	Italy
	Malta
	Netherlands
	Portugal
	Spain
	Switzerland
	United Kingdom
	Yugoslavia
Latin America	Brazil
	Chile
	Others
	Argentina
	Bahamas
	Barbados
	Belize
	Bolivia
	Colombia
	Costa Rica
	Cuba
	Dominica
	Dominican Republic
	Equador
	El Salvador
	French Guiana
	Guadeloupe
	Guatemala
	Guyana

Region	**Countries**
Latin America (Cont'd.)	Haiti
	Honduras
	Jamaica
	Martinique
	Mexico
	Netherlands Antilles
	Nicaragua
	Panama
	Paraguay
	Peru
	Suriname
	Trinidad & Tobago
	Uruguay
	Venezuela
Asia-Pacific	Japan
	Developed Oceania
	Australia
	New Zealand
	Others
	Far East
	Bangladesh
	Bhutan
	Brunei
	Burma
	Darussalam
	Hong Kong
	India
	Indonesia
	Laos
	Macao
	Malaysia
	Nepal
	Oman
	Pakistan
	Philippines
	Republic of Korea
	Singapore
	Sri Lanka
	Thailand
	Other Developing Market Economies
	Fiji
	French Polynesia
	New Calidonia
	Papua New Guinea

Region	Countries
Asia-Pacific (Cont'd.)	Samoa
	Solomon Islands
	Tonga
	Vanatu
Africa and Middle East	Africa
	Middle East
	Afganistan
	Bahrain
	Cyprus
	Iran
	Iraq
	Israel
	Jordan
	Kuwait
	Lebanon
	Libya
	Qatar
	Saudi Arabia
	Sudan
	Syria
	Turkey
	Yemen
Centrally Planned	USSR
	Eastern Europe
	Albania
	Bulgaria
	Czechoslovakia
	Germany (GDR)
	Hungary
	Poland
	Romania
	China
	Others
	Korea DPR
	Lao PDR
	Cambodia
	Mongolia
	Viet Nam